The Northwestern MILLER
MILLING PRODUCTION SECTION

Electron Treatment of Wheat and Flour to Stop Insect Reproduction

By V. H. Baker, O. Taboada and D. E. Wiant

Tests made by the agricultural engineering, entomology and home economics departments at Michigan State College in cooperation with the Upjohn Co. of Kalamazoo, Mich., indicate that adult granary weevil and flour beetles can be killed with accelerated electrons from a Van de Graaff generator. (a) Relatively low doses of accelerated electrons sterilized eggs of the above insects and also prevented adults from reproducing.

Insects do at least $300 million damage to grains, flour, etc., each year in the U. S. Some of those which attack wheat drill into the kernel, lay eggs, and the resulting larvae eat most of the kernel. Two of the worst pests of grain products, the granary weevil and flour beetle, were selected for tests using accelerated electrons. Both of these insects may develop from egg to adult in a month, live up to one year, and may lay as many as 500 eggs.

EDITOR'S NOTE: V. H. Baker, one of the authors of the accompanying article, is a research professor at Virginia Polytechnic Institute, Blacksburg, and formerly was on leave at Michigan State College. O. Taboada is a graduate assistant in the department of entomology at Michigan State, and D. E. Wiant is a professor of agricultural engineering at Michigan State.

Testing procedure varied slightly to suit the nature of the two species, but in general the procedure consisted of counting a known number of insects into a dish containing a weighed sample of wheat or flour. The samples were then placed in a constant temperature, constant humidity incubator, in order to allow sufficient time for the insects to do their egg laying. Then most of the samples were irradiated with varying dosages of accelerated electrons, with some samples left untreated as controls.

Machine Used For Tests

A sketch of the Van de Graaff electron accelerator used for the treatment is shown in Fig. 1. The accelerated electrons, known as cathode rays in the television tube, are shot from an electron gun in the Van de Graaff generator. The charge on the machine in Fig 1 builds up to about 2-million volts. This potential causes the electrons emitted from a hot filament to travel down through the long vacuum tube of the accelerator. The electrons approach the speed of light as they travel down through the barrel of the electron gun, and they pass through a thin aluminum window into the product to be irradiated on a conveyor belt.

Applied dosages of electrons were measured in **rep** (roentgens equivalent physical). The rep is a very small quantity of energy and may be defined in terms of calories, or kilowatt-hours. A dosage of 100,000 rep is equal to about 0.20 calories per gram. A dosage of 100,000 rep will raise the temperature of a one gram sample of wheat or flour about ½ degree centigrade. A dosage of 500,000 rep will raise the temperature of this same sample about 2.5 degrees centigrade.

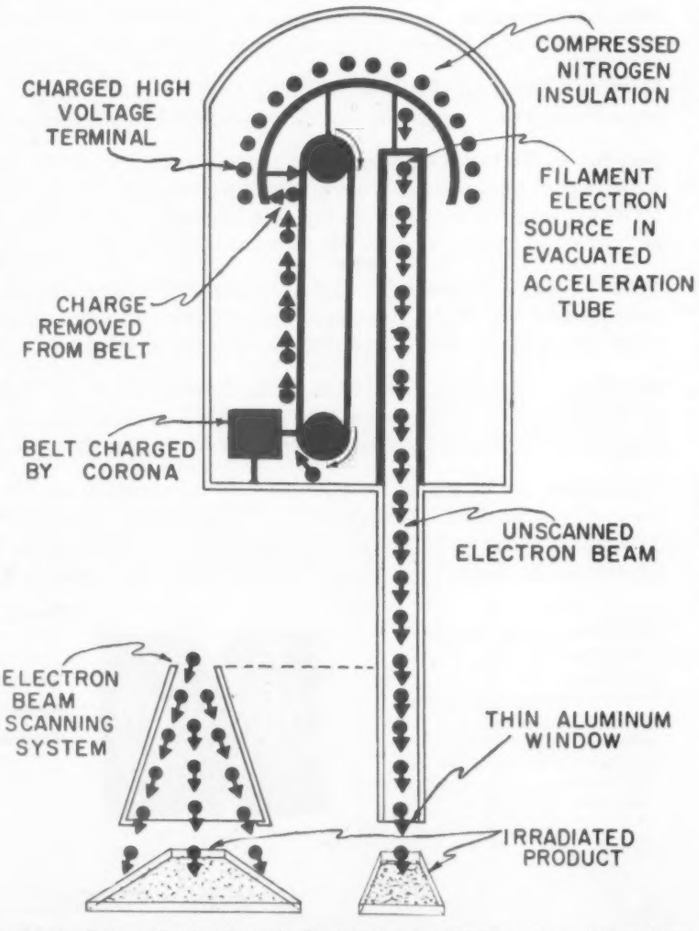

FIG. 1—Schematic sketch of the Van de Graaff electron accelerator with unscanned electron beam irradiating a product on a conveyor belt. A beam scanning system may be installed in order to irradiate over a wider area.

Rate and Depth of Treatment

How much wheat or flour can be treated on a continuous basis? This is one of the first questions asked by millers. Although all the samples treated for the test reported were treated in small dishes, with the proper feeding mechanism, the samples could have been fed onto a conveyor belt and passed through the electron steam for treatment.

Calculations show that a depth of about ⅜ in. of wheat or flour can be treated with a 2 million volt machine, a depth of about 9/16 in. of wheat or flour with a 3 million volt machine, and a depth of about 15/16 in. of wheat with a 5 million volt machine. The width and speed of the conveyor belt can be adjusted to give various rates, provided the machine used has enough electrical capacity for the dosage desired.

It is theoretically possible to treat up to 3,800 lb. with a dose of 100,000 rep of wheat or flour per hour using a 2 million volt machine, and up to 38,000 lb. per hour receiving a dose of 10,000 rep. In practical use a rate of 10,000 lb. per hour may be a satisfactory rate.

Some Results of Tests

Results of some of the first test are shown in the charts Fig. 2 and Fig. 3. The test shows that 80% of adult granary weevils died within one week after receiving a dose of 100,000 rep; (see Fig. 4) whereas about 90% of adult flour beetles died one week after receiving a dose of 250,000 rep. Complete kill, immediately after treatment, was obtained with 250,000 rep for the granary weevil and 500,000 rep for the flour beetle.

For practical purposes dosages much lower than mentioned above may be sufficient for insect control. Other data, not shown in Figs. 2 and 3, indicate that a dose as low as 10,000 rep will sterilize granary weevil and flour beetle eggs already laid, and this same dosage prevents adults of these insects from reproducing.

Preliminary baking and taste test conducted by members of the home economics department at Michigan State College showed that a satisfactory loaf of bread can be made

(Continued on page 20a)

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A "Direct-Line" Mill Flow Diagram

By Henry Nelson
Fisher Flouring Mills Co.

Men who take a part in producing and preparing food to nourish mankind belong to the most essential and honorable of all professions. Among these, because of the unique qualities of the wheat seeds, the processors of wheat have been and must remain in a prominent position. Millers of wheat flour have acquired great skill and efficiency through generations of experience and will continue to advance by making use of new knowledge and improved practices.

While the industry will conduct and sponsor research, the individual operative miller may improve his own knowledge and ability by personal study and application. A man whose intention it is to spend years of his life in a flour mill would advance more rapidly if at the earliest possible time he made himself familiar with the method of production and the flow of a mill. For such studies, of course, mill flow sheets are recommended. However, these are complicated with so much, for the beginner, less important detail that they are difficult for him to follow. To provide an intermediary step from which the student should advance to the flow sheet at some later time, a new, simplified "direct-line" type flow diagram of a five-break mill is herewith presented, which illustrates directly and at a glance each step in the flow as well as furnishing the over-all pattern of the method of gradual reduction.

The object of flour milling is to remove the bran layer of the wheat from the endosperm and to reduce the endosperm to flour. For this purpose mills are equipped with a series of sets, quite often five, of corrugated break rolls to remove the bran, and a longer series of reduction rolls, most or all of them smooth, to reduce the endosperm. The first three breaks will open the wheat and break off most of the endosperm; the two remaining breaks will scrape off the rest. Breaking and reduction is done step by step by many grindings, each being followed by a grading by sifting on a gyrating sifter, supplemented by a sorting and purification of sizings and middlings on middlings purifiers.

It is never possible to remove all the bran particles from the endosperm. As stocks are ground over and over aagin, an increasing number of extremely small bran particles will be incorporated in the flour streams. Since bran is higher in ash content than endosperm is, this is one reason why flour streams increase their ash content as we move toward the tail of the mill.

A cleaner, better product is made when the reduction process is begun with a maximum of large, clean particles of endosperm, followed with a gradual reduction from sizings and coarse middlings to smaller middlings, and so on to flour. Each grinding produces endosperm of a smaller average particle size than before; but the full scale of particles is there, from the largest for a particular classification to the very smallest. Each grinding, therefore, also produces at least some small amount of flour, which is promptly taken away.

EDITOR'S NOTE: The accompanying article is from the Bulletin of the Association of Operative Millers.

Simple Diagram

Turning our attention now to the flow diagram, we notice first that it is very simple. Each processing of stock is indicated by a rectangle containing its short identifying description. A small circle in the upper left of the rectangle designates a grinding followed, of course, by a sifting. Incoming streams are collected in the upper left corner, and outgoing streams, except flour, leave at the lower right, from where each takes the most direct path and, therefore, the easiest one to follow to its next destination. Flour removed is designated by a short vertical arrow near the lower left corner and the letter "F."

It will be noticed at once that the rectangles collectively do not form a neat geometrical design, but they are not placed on the paper haphazardly. Remember, we prefer to make flour from middlings. We start with a vertical row of breaks in the upper left of the diagram and place a vertical row of middlings near the middle. Our steps towards making the middlings through purifiers, etc., are then from the left toward the middle. The residue streams, which are mostly composed of tailed off and scalped off material from processed middlings stocks that did not give up all of its middlings, will be gathered in a row to the right of the middlings, and when the residue is ground the reclaimed middlings will be carried back to the left to join the streams from the middlings reductions. The offal—bran, shorts, and red dog—are beyond the residues on the extreme right in the diagram.

We shall proceed to follow the wheat from the first break in the upper left corner of our chart on its course through the mill. Moving along with the flow, we shall, when possible and convenient, treat similar and related streams as groups to escape the monotony of much repetition. It shall be understood whenever we say stocks are directed to certain classifications that a grinding and a sifting always follow except when it is apparent that no grinding can take place as in the case of purifiers, break redust, bran and shorts dusters, and their dustings.

One of the first things to be noticed on the diagram is that released ground material from the first four breaks which ranges in size from sizings to fine middlings after preliminary sifting and sorting on gyrating sifters is sent to middlings purifiers for further sorting and segregation of the branny particles. Flour is taken out after each break sifting and the top scalp is raw material for the next break. We shall first observe the stock from the first three breaks which contains all of the best and the cleanest of the endosperm.

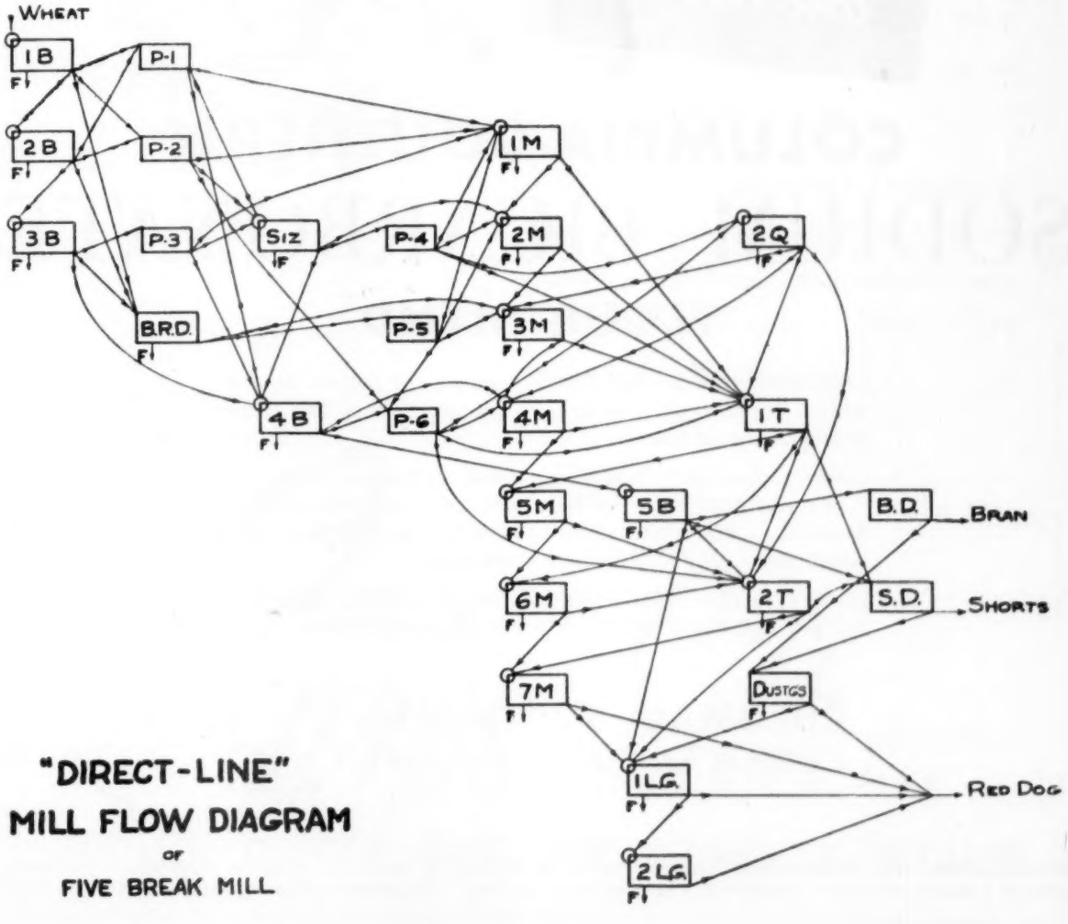
Sizings stock from the 1st and 2nd breaks is combined and sent to the sizings purifier (Purifier No. 1); coarse middlings stock from 1st and 2nd breaks is combined and sent to the coarse middlings purifier (Purifier No. 2). The quality of the 3rd break sizings is usually inferior to that of the first two breaks and it is therefore handled on a separate purifier, usually called the 3rd break purifier (Purifier No. 3).

Middlings Rolls

Before considering the purification of the fine middlings made on the first three breaks we shall first follow the coarse separations from the three purifiers mentioned to their preliminary destination, the middlings rolls. Each purifier delivers a quantity of clean middlings to the first middlings rolls, and sizings to the sizings roll. There may be enough middlings to divide into coarse and fine, or enough sizings for a division into "A" and "B" grade. We shall make no such distinction here.

The branny tailovers from these purifiers, first, second and third break stock with all readily obtainable middlings removed by purification are logically fourth break material; the tailover from the coarse middlings purifier however, being of a somewhat smaller particle size, originating from the third separation in the first and second break sections, will not be reground at this time but sent directly to the purifier which handles the fourth break middlings.

The stock coming from the purifiers to the sizings roll is large granular pieces of endosperm, germ, bran chips and bran clinging to the endosperm particles. Our aim is to reduce the endosperm to the size of middlings, then purify them and send them on to the middlings rolls for their final reduction to flour. The following separations are made by the sizings sifter: the scalp consisting of flattened bran fragments,



"DIRECT-LINE"
MILL FLOW DIAGRAM
OF
FIVE BREAK MILL

etc., which goes to the fourth break; the second separation, granular endosperm with considerable grain adhering, which is sent to the sizings re-purifier (Purifier No. 4); next a considerable amount of very good middlings which may be graded coarse and fine and directed to the second middlings rolls; and finally the flour, which it may be noted has about the lowest protein and ash content of any flour stream in our mill.

The sizings re-purifier is also sometimes called the second quality purifier, because usually a good percentage of the stock it handles is sent to second quality, which we find near the top in the right portion of the diagram. Second quality is the best of the so-called residue classifications, (the other two being in the order of their value first and second tailings, found directly under second quality). The head cuts of this purifier are graded second and first middlings and the tailover is sent to first tailings.

Fine Middlings

We shall now return to the breaks on the left of the diagram to pick up the fine middlings. The fine middlings made on the first three breaks are contained in the "dustings." There was not enough flour cloths in the stacks to take out all the flour that was made, so the dustings must be bolted in a "break redust" section (marked B.R.D.); the flour now comes out; some small amount of clean middlings is spouted directly to third middlings; but the greater part goes to the fine middlings purifier (Purifier No. 5). It is segregated here into first, second and third middlings and the tailover, which because of its small particle size will not be ground but sent directly to the purifier handling the fourth break stock.

We have now by various routes, but from the same original sources, namely the combined first, second and third breaks, obtained large quantities of good first, second and third middlings. We are ready to make flour, the biggest streams and the best quality in the mill. As we proceed from one middlings reduction to the next we observe that of the load to each reduction up to one-half is recovered as flour; the dustings are advanced to the next middlings reduction, the scalps are sent to tailings.

The fourth break stock received from its various sources has little endosperm left and what there is comes from the layers next to the bran and so is very poor in quality. Please note that fourth break on the diagram has been placed nearer to destinations of its discharges, indicating thus in a general way its own quality by its position on the chart. The middlings material is sent to the fourth break purifier (Purifier No. 6), where it combines with the tailovers from the coarse and fine middlings purifiers. The dustings over the flour cloths are sent directly to the 4th middlings roll. From the 4th break purifier only 4th middlings and residue is obtained in each of its three grades, namely second quality, first tailings and second tailings; for that reason it is sometimes named the residue purifier.

5th Break Stock

The 5th break stock has the nature of poor residue material, and near the residue line quite far down on the chart is where it is placed; its segregations have only short distances to travel; they are routed to bran duster, shorts duster, 2nd tailings, 1st low grade middlings, and flour. There is no purifier.

At this point, as the diagram clearly demonstrates, the task yet left to be done is the reduction of the remaining middlings and residue streams and the extraction of whatever flour is left in them. As before some flour will be obtained at each reduction, from residue as well as middlings, including the low grades, although no specific mention is made of it at the time.

We pick up the middlings again where we left off, at the 4th middlings roll, which is approximately in the center of the diagram. As before all dustings from middlings are passed on to the next middlings reduction even through the 7th middlings into the 1st and 2nd low grade, and the reclaimed streams at various points; in the diagram the direction of these middlings from residue is to the left and down.

Second quality, our best residue, is all purifier stock containing considerable endosperm off air quality; reclaimed middlings are brought back to 3rd and 4th middlings, and scalps are sent to inferior residue, namely 2nd and 1st tailings.

First tailings, received from 2nd quality, sizings re-purifier, 4th break purifier, and from the good middlings reductions, namely 1st, 2nd, 3rd and 4th middlings, yields some 5th and 6th middlings, some 2nd tailings material, and the rest is small celan bran, or as we say, reduction shorts.

Second tailings has been received from 5th break, the 4th break purifier, 2nd quality, 1st tailings, and the 5th and 6th middlings. We recover some poor middlings which we send to 7th middlings, and some other middlings one step poorer than 7th middlings, namely 1st low grade. The rest is shorts.

Care Must Be Taken

When returning reclaimed middlings from residue to middlings reductions, care must be taken to prevent a ring of stock from building up; middlings recovered from a certain residue must be sent along to

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some middlings reduction the scalp of which goes to an inferior grade of residue and not to the same residue where the middlings were recovered in the first place. Such a ring could not escape detection on a flow diagram of this type. In the same manner it is seen that the scalp from the 7th middlings cannot be sent to 2nd tailings as that would create a ring; the next step down is feed; so we shall send it to red dog.

We turn our attention to the bran and shorts at the extreme right of the chart. A small amount of poor endospermic material still adheres to them and this we proceed to remove in the bran and shorts dusters. The bran and shorts now go to the packers. The bran and shorts dustings are sifted, flour is removed, scalp sent to red dog and the remaining low grade middlings, together with the low grade middlings released by the 5th break and those reclaimed from 2nd tailings, are combined with the low grade middlings carried forward from the 7th middlings to the 1st low grade roll; and since the stream from the 7th middlings amounts to less than the total of these various other streams, the low grades have been placed separately slightly to the right of the middlings row. From the 1st low grade dustings go forward to 2nd low grade for the final processing. The scalps of the low grades can be nothing but red dog. They are combined with the red dog from the 7th middlings and from bran and shorts dustings and together they end up at the red dog packer.

Some Important Facts

The joining of the red dog streams in the lower right of the diagram marks the completion of the flow; but in retrospect some important facts about the flow may be pointed out. All the good endosperm is released by the first three breaks; it is contained in a total break extraction of these breaks which may amount to from 75 to 80% of the total wheat; practically all of the material from which patent flour is obtained is included in this extraction.

No material originating from or following the 4th break enters the first three middlings reductions, except one significant stream to 3rd middlings from 2nd quality. That explains why the 1st, 2nd and 3rd middlings flour streams, besides being our biggest sources of patent flour, also can be so very low in ash. But the picture soon changes. In the successive middlings reductions the granular endosperm is gradually depleted and a proportional increase of residue material and of the stocks from 4th and 5th break is found. As a consequence, the extracted flour streams decrease in quality and in baking quality as we approach the tail of the mill. A few of the tail-end streams may be segregated and packed as "clear" flour while the main group then is termed the "patent." Just as often all the extracted flour streams are mixed, and the flour is then a "straight" flour.

But be they "straight" or "patent" or "clear," they all have their specific use and purpose and all together they possess those wonderful qualities which make wheat flour the principal ingredient of bread, our staff of life.

Treat Couplings Right

★

By E. J. Clement

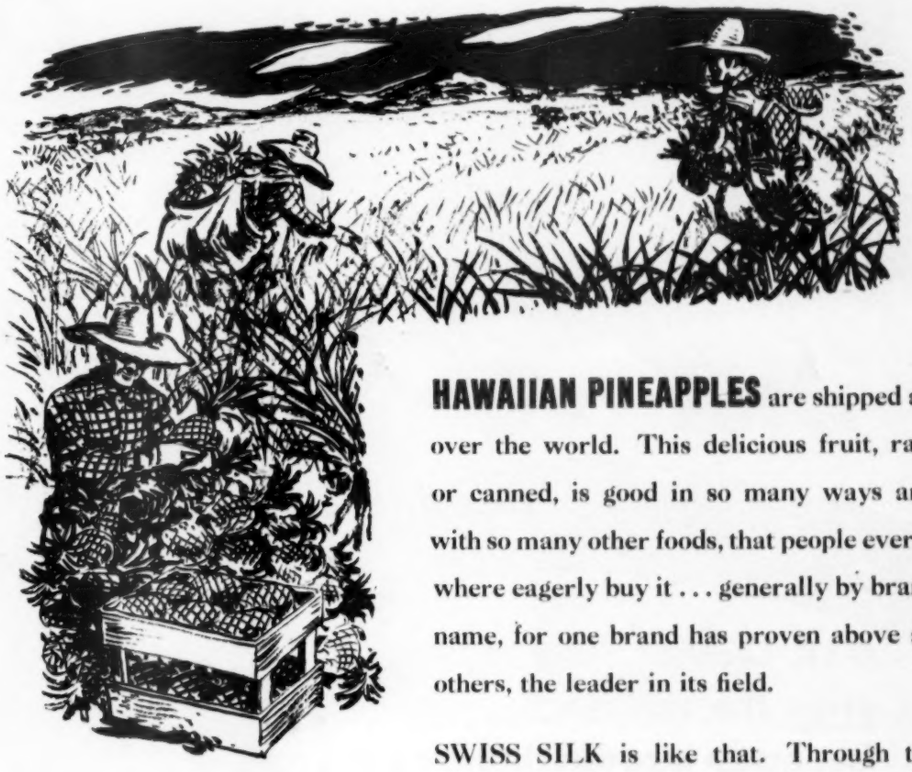
Couplings perform valuable functions in fields of mechanical power transmission. They are used to fasten and connect shafts together end-to-end—and shafts, long and short, are a most important medium for transmitting power in industry.

Couplings transfer the twisting, rotating action, called torque, from one end of the driving shaft directly to one end of the driven shaft. They transmit rotative power without speed change and without absorbing too much power themselves.

This end-to-end coupling feature of direct connection distinguishes these devices from other kinds of appliances for the transmission of power from one unit to another. It should be borne in mind too that the coupling differs from the conventional universal joint.

Couplings are used to join sections of long line shafting together as well as to connect the shorter shafts of all kinds of power drive machines or prime movers directly to the shafts of driven units or equipment. These driving units may be electric motors, gas engines, diesel engines and other kinds of motive power; and the driven equipment may be pumps, compressors, fans, speed reducers, conveyors and so forth.

Another use for couplings is that of making it possible to separate easily the connected ends of shafts. This need for separating direct-connected units for service or replacement of bearings or other components occurs in many plants. In such specific applications of couplings,



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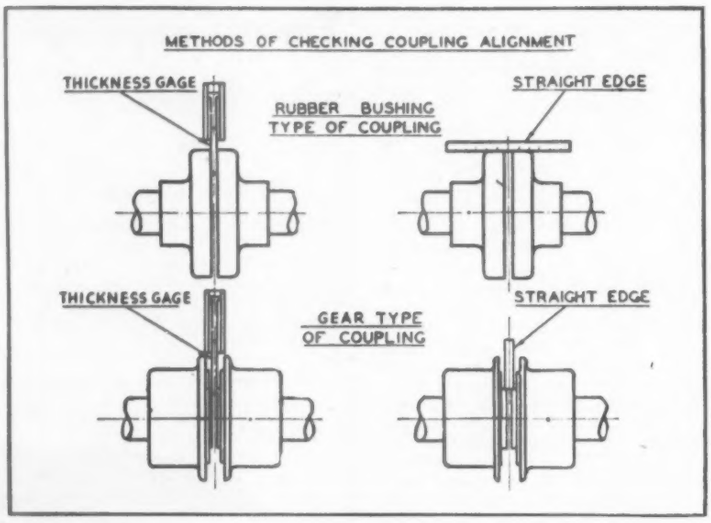
Alignment Is Important

Perfect alignment is naturally desirable in direct-connected drives. It is readily possible to obtain at least near-perfect alignment of shafts in original installations. Extra care should be taken therefore in aligning shafts, especially since some types of couplings have to be aligned more carefully than others.

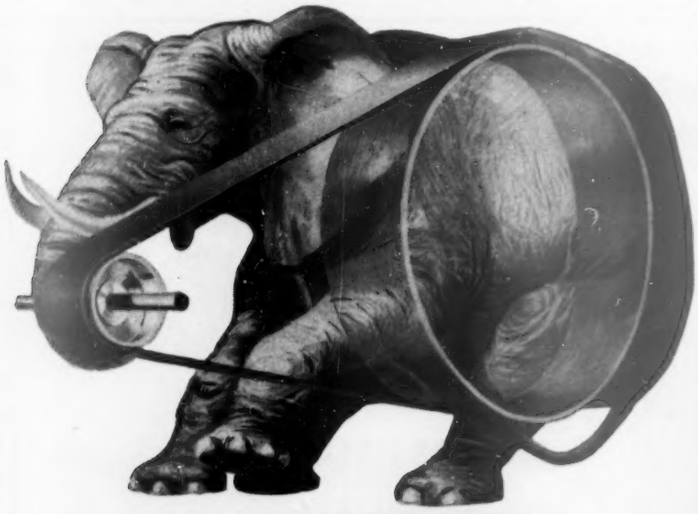
It often becomes necessary, however, to compensate for any misalignment of shafts which may be caused by distortion as the result of the heating of units, by settling of the base or bases, by severe shocks of heavy or uneven loads, by vibrational forces and so forth.

When such misalignment can occur, it should be amply provided for in the coupling. Also when it is possible to determine the amount of misalignment that may develop, provision for such developments should be made by installing a coupling with the right compensating capacity so that the unit will work properly.

Checking of misalignment then is most important at the time of installation — and periodically during operation. Excessive misalignment should be avoided because it tends to exert wearing pressures on the bearings of the connected units.



There are a great many designs and makes of couplings available today. Th's fact makes any discussion of the subject a fairly involved one. This article, therefore, does not plan to be a catalog of couplings, and



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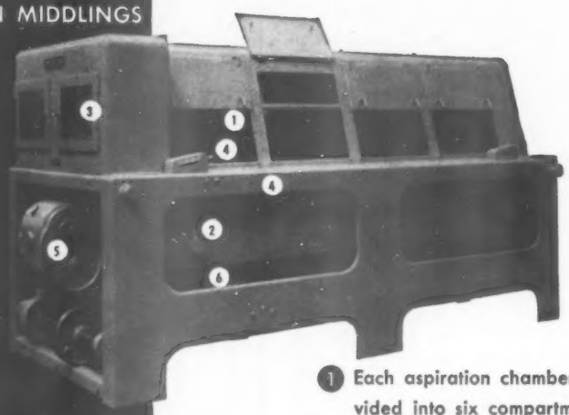

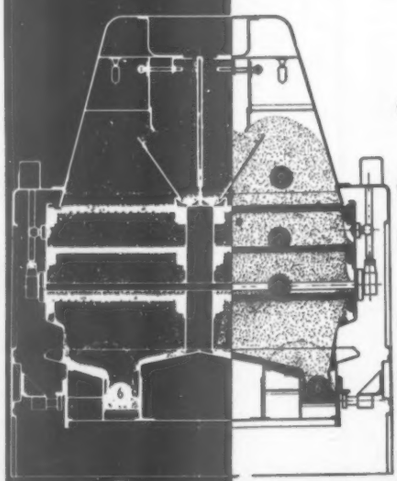

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only a very few of the many good ones on the market can be mentioned. Nevertheless, general facts pertinent to all coupling application and performance can be presented.

Don't Neglect Couplings

One very important consideration is that most couplings come as a part of original equipment, such as a motor-driven pump or compressor, for example. As a result the user naturally considers the coupling as the responsibility of the manufacturer of the complete unit or installation. This fact, however, should not lull the plant manager or the man in charge of maintenance into neglect of couplings. Quite the opposite—proper periodic attention paid to couplings can often prevent trouble and expensive damage to bearings and other operating elements of the installation.

So don't take your couplings for granted. Study them, find out who manufactures them. Learn all you can about them so that you know them well—what they can do and what they cannot do.

Certain couplings are designed for more misalignment than others. Some are manufactured to withstand shock loads and overcome vibration difficulties; others are not intended for such services. Certain devices require lubrication while others do not. So the better you know your couplings, the better and longer will they and the related equipment serve you.

Here is another point to remember. It relates to the fact of couplings being a part of original equipment. Suppose for the sake of argument that a plant has a dozen direct-connected machines in its factory set-up. Each of these machines might conceivably have a different make or design of coupling—each one possessing different characteristics. In such a case it is more than ever necessary to know your couplings well for the best operating results.

So follow the suggestions for good coupling treatment, which are listed for convenience.

Kinds of Coupling

As already stated there are a great many designs and makes of couplings. Fundamentally, however, there are two basic types: rigid and flexible.

Rigid couplings provide a fixed union or solid connection between two shafts where misalignment is not possible. Flexible couplings are those which are designed to accommodate shaft misalignments; angular, parallel, or both; also end play. However, flexible couplings "should not be used as the excuse for careless installation."

Besides the normal uses of couplings there are special-purpose arrangements of various kinds. Many of these are merely variations of regular designs of flexible couplings.

One is the brake wheel type in which brake shoes mounted in a brake drum are used for the quick stopping of rotating elements. Common applications of them are in hoists and cranes.

Overload release couplings are devices in which the connection breaks before any overload can seriously damage an installation. Thus they protect machine elements in case of sudden stops or jams or other shocks. One means of accomplishing this purpose is by shear pins in the coupling; another is by use of a coupling which "slips" momentarily when subject to abnormal shock loads.

In hydraulic couplings, which are also of the flexible type, oil or other driving fluid is used to transmit energy from an impeller to a runner.

Floating shaft arrangements are really elongated flexible couplings. They consist of an intermediate and independent shaft and a separate coupling at each end for double engagement. One use of them is where misalignment requires an unusual amount of flexibility in all directions. Another application is where the driving and the driven units are at a reasonable distance from each other.

Couplings may be specially insulated to prevent stray electric currents from flowing from one shaft to the other. One way in which this is accomplished is by inserting an insulating disc in a non-conducting sleeve between the two hubs.

Then there is the clutch or cut-out type which permits disengagement without uncoupling. It may transmit driving force by friction of contacting surfaces; by interlocking jaws, dogs or teeth; by hydraulic means through fluids; and by the creation of electrostatic fields. Clutches, however, are usually treated as such rather than as a member of the coupling family.

There are, of course, other couplings made for special purposes. This article, however, is limited to some

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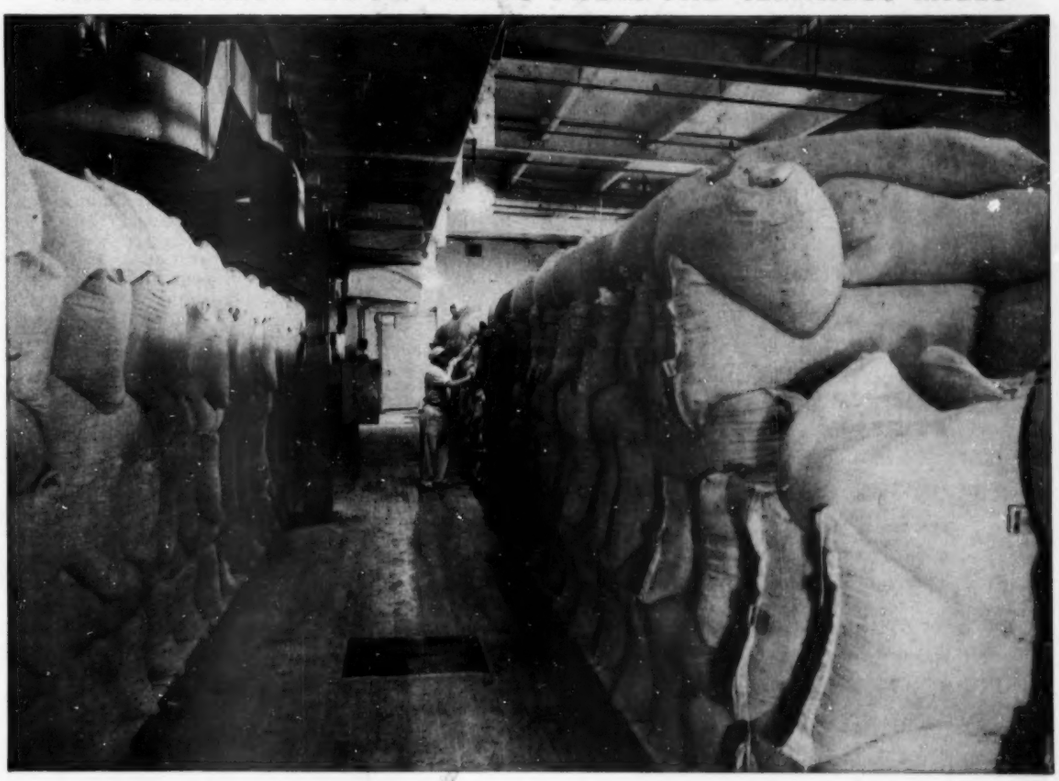

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of the more general kinds of rigid and flexible couplings.

Rigid Couplings

Rigid couplings are of several forms. One type is a sleeve-like device that fits over the shafts and is secured by means of set screws, keys or taper pins. Sleeve couplings are usually used on small shafts and for relatively light work, although heavy duty makes are available. They join shafts of the same or different diameters.

Bolted sleeve type couplings of split and ribbed constructions are also made. They clamp firmly on the shafts and hold by compression and may or may not be keyed.

For several loads and heavy duties, flanged rigid couplings are commonly used in permanent installations where shafts are well enough aligned for rigid coupling. There are many varieties of flanged couplings.

In one plain kind the flanges are press-fitted or shrunk onto the shaft and keyed. Flange faces are perpendicular to the shaft centerline. Where side loads or pulls are light, shaft ends can be kept in line by having one shaft extend slightly into the coupling flange that is keyed to the other shaft. If the loads and pulls are heavy, the following construction may be used: one flange has a recess and the other a projection which is made to fit into the recess.

Keyless couplings of the flange type are also available. Certain designs make use of taper bushings and taper flanges.

Shaft couplings of the integrally forced flanged type, "such as are used for both horizontal and vertical connections between generators and turbines, in hydroelectric installations," have been standardized as to dimensions. The shaft diameters covered by the American Standard (ASA B49.1) range from 3½ to 48 in. Most of the shafts in such installations are of special design and require the greatest possible selection of sizes.

Flexible Couplings

The causes of misalignment have been presented before. Shaft misalignment may be of several kinds. One, the shafts may be parallel, but off centers to each other so that their axes do not coincide. This is called parallel or offset misalignment. Two, shafts are not parallel and are out of line with each other. In this case the displacement is angular. Three, the two shafts may be both off center and out of line. Such misalignment is a combination of parallel and angular.

Flexible couplings have been designed to compensate for reasonable misalignment. Also in some cases, provision must be made to take care of any end play or longitudinal variation that may arise from thermal expansion.

This so-called flexibility of a coupling is obtained in several ways. For example, couplings may have hard parts which fit together loosely, or a lubricated, sliding action may be provided for close-fitting hard parts. Couplings may be made flexible with elastic or resilient connecting parts without lubrication. Combinations and other methods are also used.

It should be remembered that the flexibility of many couplings is considerably limited; also that designs and makes of couplings vary as to the amount of misalignment they can accommodate. In other words, all designs do not correct all kinds and amounts of misalignment. For example, in parallel offset capacity, they usually vary from 1% or less to 5% or higher of shaft diameter. In angular misalignment they may range from a fraction of one degree to six degrees or more. Double type or double displacement coup-

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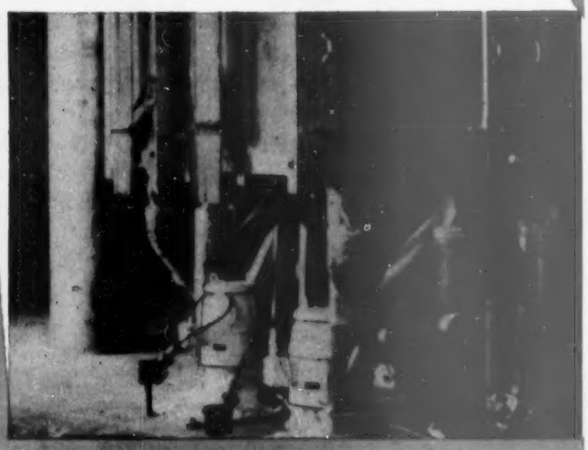

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lings naturally compensate for greater misalignments.

It is most important then that the right coupling be selected for a given job. Factors which influence the selection are listed elsewhere.

Horsepower Rating

One common method of rating horsepower of couplings is to use the value at 10 r.p.m. and the following formula is suggested by some manufacturers:

Horsepower at 100 r.p.m. = Horsepower x Service Factor x 100 ÷ Revolutions per Minute.

The type of driving and driven machines determines the service factor, and manufacturers supply those values for the various kinds of drives. The formula is used after the necessary information about the drive is furnished, such as the horsepower and speed of the driving machine, the kind of driven equipment, the shaft sizes of each unit and so forth.

With the rated horsepower at 100 r.p.m. determined, reference is made to manufacturers' specification tables for their various couplings to obtain the right size coupling—the size which equals or exceeds the computed power. Some manufacturers have tables that list the horsepower ratings of couplings at other speeds than the 100 r.p.m. values.

Horsepower capacity of couplings ranges from a fraction of a horsepower to some 70,000 and considerably more horsepower.

Aligning Couplings

One of several ways of obtaining accurate alignment is to lay a straight edge across the shafts or the coupling sections at several points around their circumferences. Thickness or feeler gages may be used for checking. Be sure to allow sufficient clearance to take care of end play.

Flexible Coupling Designs

Methods for obtaining flexibility in couplings have been presented. It has also been stated that there are a great many designs and makes of flexible couplings. A few of them will be mentioned and their descriptions are presented in order to give some idea of different flexible coupling designs.

Flanged type couplings are very common. One bolted design has flaxible rubber-bushed bearings and metal studs. The pins or lugs alternate on each flange face and the coupling is keyed to the shaft. Another model of flange and lug form has an intermediate compression disc made of laminated fabric impregnated with neoprene, or an oak tanned leather disc may be used.

A certain bolted flange coupling has a flexible medium with a knob disc made of rubber and fabric. A variation omits the protecting flange rim.One pin and flexible disc type flange coupling uses taper bushings for securing a tight fit on the shaft.

One model of flexible coupling has two metal knobs and a load cushion insert of rubber. The coupling jaws and inserts provide a tongue-and-groove effect to lock the rubber of the insert. Still another makes use of a special laminated steel ring for flexiblity and power transmission; all parts are bolted together.

Gear or spline constructions are also used. There are several designs of them. They may have spur geared hubs which mesh with an internal gear on a casing or sleeve. The sleeve may be of one piece or split and bolted together. In another form, there is a spur gear on one hub and a mating internal gear on the other hub. An oil film provides sliding contact between the metal contacting parts.

A representative roller chain coupling consists of two steel sprockets connected with a double width roller chain. Similar couplings employing silent chains are also made. Covers help to hold in the lubricant and may be stationary or revolving.

A grid-groove design of coupling employs a resilient alloy steel grid wound to fit into curved grooves cut into the hubs of the coupling. The grooves provide a bearing surface for the grid. A nonfluid lubricant is sealed in the coupling.

Another design of coupling, which utilizes the pneumatic principle, has a resilient inflated rubber gland consisting of an inner fluid container and outer section of multiple layers of fabric and rubber bonded to the inner gland.

Flexible couplings with a pre-loaded rubber biscuit assembly are also offered. The resilient neoprene cushions of this radical assembly type are bolted to alternate flanges. No lubrication is required.

These are only a few of the many couplings on the market. Also when unusual applications are encountered, the conditions of operation may call for a special design of coupling.

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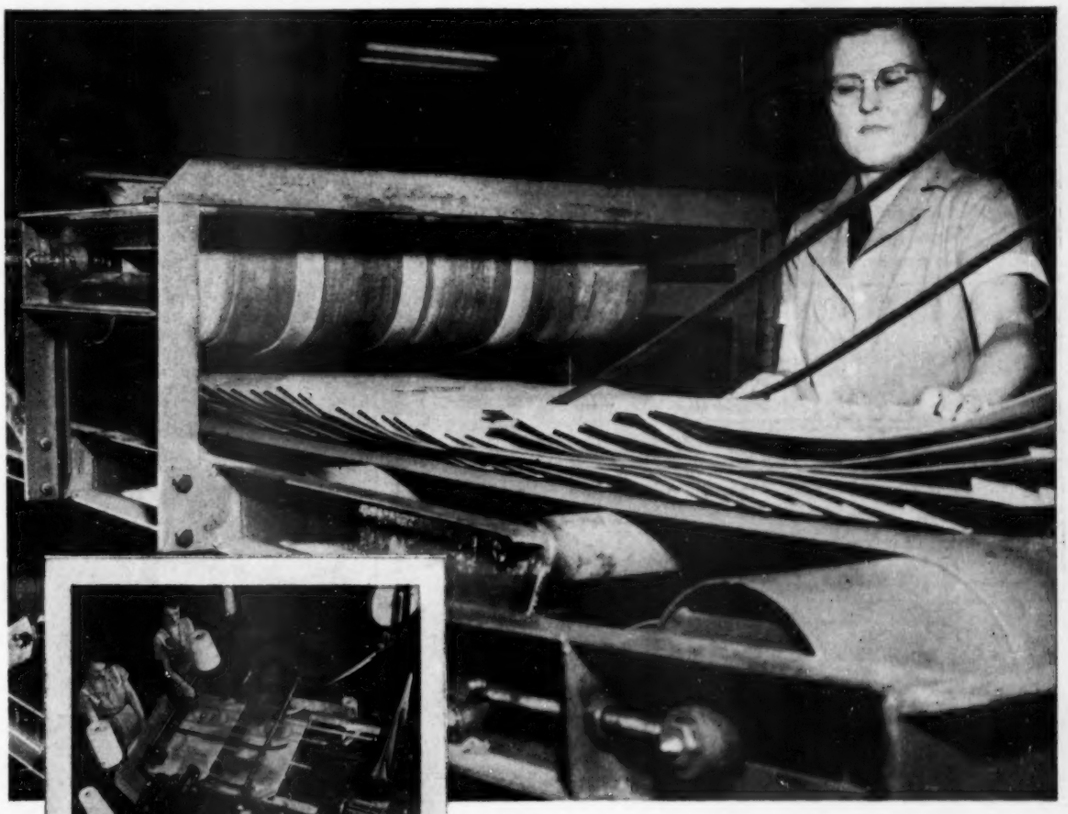
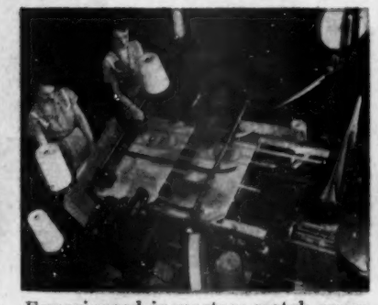
EDITOR'S NOTE: The foregoing article is from the P. T. C. Bulletin of the Power Transmission Council.





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Safety Factors for Personnel in Plant Sanitation Programs

Safety factors to be considered in plant sanitation programs are outlined in a service letter by Glenn O. Munger of the Industrial Fumigant Co., Kansas City.

Among the points discussed are situations connected with normal plant operations which inspectors may encounter. Also outlined are hazards involved in the use of chemical materials in control programs.

Mr. Munger writes:

The subject of safety is one which is very important in all fields of endeavor. Safety on and off the job is something that should be constantly practiced by everyone. Safety campaigns are a general rule in many plants although the programs vary considerably from plant to plant.

Safety is generally stressed to a high degree in the operating and production departments. These locations have personnel present at all times and they must be on guard continuously to avoid accidents and injury.

The personnel of the plant responsible for the sanitation program are usually present in these departments only part time. Their duties take them over the entire plant, and this requirement of working in all sections exposes them to all the hazards of the plant rather than to those of one particular department or section. For this reason, the sanitation program personnel should be aware of the hazards that are present in all departments and should be familiar with the good safety practices and procedures for avoiding accidents and injuries.

Many Factors

The safety factors that shou'd be considered by the sanitation personnel are many. There are added precautions that should be kept in mind and practiced in addition to those exercised in connection with the actual plant operation. These are brought about through the use of specialized equipment and materials necessary to carry out the sanitation program. The person doing routine sanitation work around the plant will be in close contact with the operating phases of the plant which includes the machinery and transportation equipment. An example may be drawn by pointing out some of the things that should be considered when making an inspection of the plant. This operation would bring the inspector into almost all the situations involved with the normal operation of the plant. In performing his duties, the inspector is exposed to the every day hazards of

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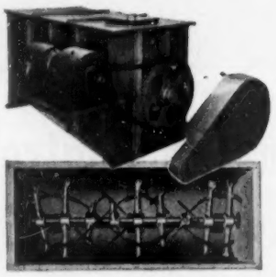

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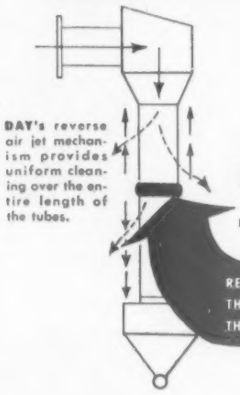

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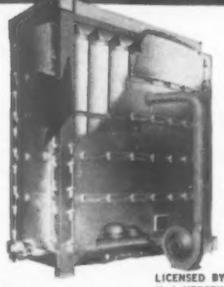

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plant operation and must be on the lookout for dangers that are or may be present.

The inspector will be working in close contact with the machinery throughout the plant. All machinery that is in operation is a safety risk and one must use care and judgment when working in its vicinity. The inspector may be looking for signs of insects, rodents, or unsanitary conditions of many kinds near the machines and must be careful not to become caught or injured. He will be interested in checking the conditions closely and may forget that he is getting too close or putting himself in a position to be caught by belts, pulleys, or other moving parts. He should have these possible dangers well in mind and govern himself accordingly when making his inspections.

Another machinery hazard that is met by the inspector is incurred in the inspection of the interior of processing equipment. There are occasions when it is desirable to sample the product as it passes through the manufacturing process. The inspector should know in advance just what the particular machine is and how it operates before attempting to sample any of the product. Such machines as screw conveyors, blenders, mixers, elevator boots, agitators, sifters, various types of grinding machines, and many others must be checked for signs of unsanitary conditions from time to time. There are methods of taking the necessary samples from these machines in such a way as to prevent any possible injury to the person doing the sampling. These methods should always be used and the person should be thoroughly familiar with how the operation is performed. The hands should never be placed in the moving machines to gather samples. This statement may appear to be a rather useless one, but every year many fingers, hands, arms and some lives are lost in just this way.

Openings a Hazard

Open bin tops, elevator shafts, loading chutes and similar openings in the floors or walls are not always covered and can present a hazard to one making an inspection. The inspector may be looking at something some distance away as he walks along and not be aware of the opening. Care should always be taken when walking about the plant to see that these openings do not become the reason for an accident and subsequent injury.

Manlifts are a hazard and the rules for using them in your particular plant should always be followed. The people riding these devices are inclined to become careless at times and forget the potential dangers involved.

Moving equipment such as hand trucks, pallet trucks, and other mobile machinery are normal in the every day operation of many plants. Careless persons are sometimes struck by accident when, if they had been looking out for the machine, the accident could have been avoided. Of course, the operator of the equipment must be on the lookout also, but you cannot always depend on the operator seeing a person in time to avoid an accident.

We have discussed a few of the hazards that may be encountered in the plant by the sanitation personnel. There are others that are of a special nature depending on the individual plant. The people working on the sanitation program should make themselves aware of these potential dangers and make special efforts to avoid accidents. Another set of possible dangers exist for the sanitation personnel that are directly connected with the operation of the program that should be known and well understood by all concerned.

Use of Chemical Materials

These special hazards arise when chemical materials are used in the various control programs. They present special handling and application problems to assure complete safety from accidents.

Insecticides that are used in and around food plants are not of the most toxic type, but they do possess some amount of toxicity to humans. The synergized pyrethrum sprays are the safest to use, both from a human safety factor as well as a product contamination standpoint. These sprays should be used with the operator taking precautions to avoid spilling them on his person or the products even though they are quite low in toxicity.

Other insecticides that may be encountered in and around the food plant include DDT, methoxychlor, lindane, chlordane and possibly malathion. These chemicals all possess toxic properties and should be handled safely. The precautions for the use of one will hold for all in that it is possible for the active ingredient to be absorbed through the skin and all contact should be avoided. This applies to mixing sprays from the concentrated form as well as to the actual spraying operation. The concentrates in particular should be handled carefully as they contain more of the toxic agent, but finished sprays should also receive the same handling care.

Devices are available for protecting the operator from inhaling the spray mist as it is applied and some form of respirator should be worn at the time of spraying. The mist formed by the sprayer can become quite heavy, especially in enclosed areas, and the respirator will make

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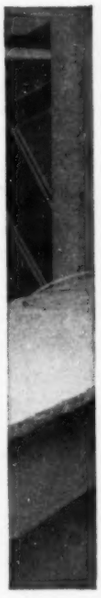

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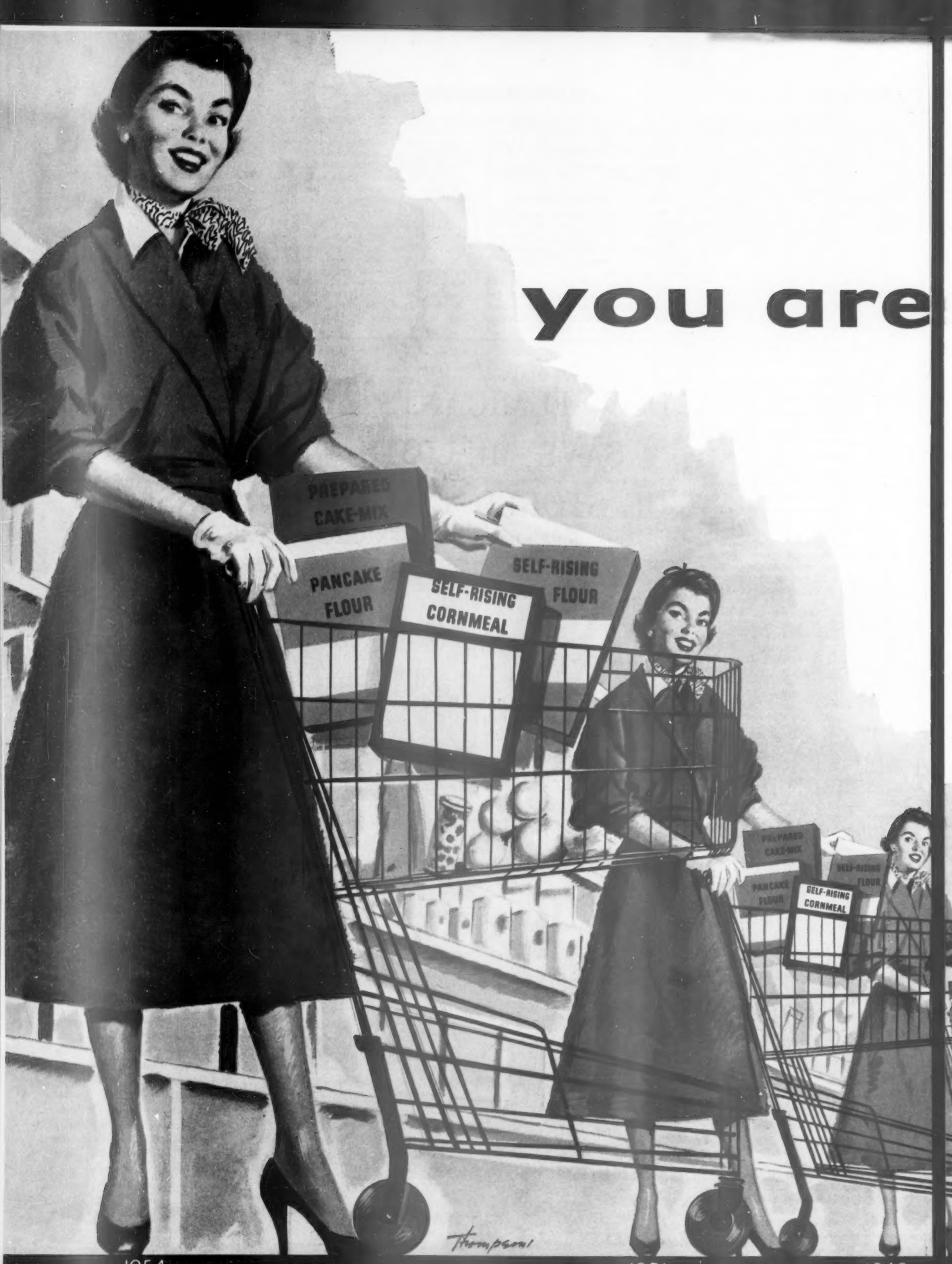
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STORAGE

OF CEREAL GRAINS AND THEIR PRODUCTS

J. A. Anderson • A. W. Alcock, Editors

CONTENTS

I. Moisture and Its Measurement • II. Chemical, Physical, and Nutritive Changes During Storage III. Microflora • IV. Respiration and Heating V. Insects • VI. Rodents • VII. Country Storage of Grain • VIII. Terminal Elevator Storage IX. Drying of Grain • X. Flour Storage in Bulk XI. Packaging and Storage of Cereal Products.

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working more comfortable for the operator as well as protecting him from the inhalation of the spray mist.

One rule of thumb that should be kept in mind when using insecticides is that if a material will kill an insect it can kill a human. This little rule is not meant to scare, but is meant only as a reminder that there is a potential hazard present when using insecticides and a little care in handling these chemicals will do much in preventing accidents.

Rodenticides

Rodenticides are another group of chemicals that may be in use in or around the food plant and they also present a potential risk to those handling this phase of the program. Warfarin and the new material called pival, both in the powder and liquid form, are the safest of the available rodenticides, but they should not be used carelessly. Other types of rodenticides such as Antu, red squill, phosphorous, arsenic and others are all more poisonous to man than the former and should be handled as such. Rodent control with chemicals is a specialized field, and only those thoroughly familiar with rodent control procedures should be given the job of using rodenticides.

Local or spot fumigants are used in many plants to control insect infestations in machinery and similar locations. These local fumigants should be applied carefully so as to reduce the chances of overexposure. If a large amount of the fumigant is to be applied, approved gas masks fitted with the proper canister should be worn, or at least they should be on hand nearby ready for use. Here again, contact with the skin and inhalation should be avoided. If the liquid has been spilled on the clothing, or shoes, they should be removed immediately to avoid blistering of the skin and possible infection from the blisters. All measuring and filling of small containers from drums or large containers should be done in a well ventilated area, preferably out of doors.

Liquid grain fumigants should be handled in much the same way as the local fumigants. An added precaution here is to never enter a bin that has been fumigated and always apply the fumigant from the outside of the bin. Other types of grain fumigants are also used and these should also be handled with care and according to directions.

The space fumigants that are used in fumigating entire plants should never be handled by anyone not thoroughly experienced in their use. Fumigation of plants is a specialized type operation calling for skill and experience and should only be attempted by qualified persons.

Special Storage Place

Each plant should have a special storage place for all the materials and equipment used for the sanitation program. This special storage place not only has the advantage of enabling the sanitation director to keep track of the supplies but also lessens the chance of accidents occurring to people not familiar with the products. The central storage location does away with the necessity of storing the chemicals and equipment in various places around the plant where all plant personnel might have access to them, thereby decreasing the possibiltiy of misuse and accidents.

All of the chemicals that are used in the sanitation program come fully labeled and also there are instructions for action should there be an accident. Another responsibility of the sanitation personnel is to be thoroughly familiar with the directions and instructions before using any chemicals in or around the plant.

We have attempted to present a few points on safety as it pertains to your sanitation program. Of course there are many things about an individual plant that may not have been mentioned, but these special instances should not be forgotten and they should all be made a part of the plan in carrying out the best sanitation program for your plant in the safest possible way. Good judgment and common sense are not only major parts in a safety campaign but are important in all phases of work or endeavor as well.

——BREAD IS THE STAFF OF LIFE——

Kansas State Uses Miniature Bakery to Study Wheat

MANHATTAN, KANSAS—Kansas State College scientists have been making miniature loaves of bread using the proverbial "thimble full" of flour—actually the loaves contain about a teaspoon of flour, and when baked the loaves have about the same volume as a half slice of bread.

To bake the micro loaves the college had fabricated special micro baking equipment, including bread pans, fermentation cabinet, and even a miniature dough mixer that is a virtual replica of standard bread dough mixers.

While the equipment would delight the heart of any child, this is not child's play. The procedure will mean an important forward step ni the development of new, improved wheat varieties.

Present methods of wheat breeding to produce new varieties are slow, costly and painstaking procedures. To determine baking and milling qualities of a new variety, between three to four pounds of grain are needed, and this amount is not available until the eighth generation. Thus, many a new variety which shows promise is abandoned after eight years of work because of poor baking or milling qualities.

The Kansas State flour and feed milling department had equipment designed for testing baking and milling qualities at the fourth generation, when 100 grams (less than 4 oz.) of grain would be available. By this time tests are run to determine protein and moisture content of the wheat and the flour, the ash content of the flour, etc., only about a teaspoonful of flour is left for the baking test.

While micro loaves may never give a precise indication of quality, they do appear satisfactory for differentiating between relatively strong and weak varieties insofar as milling and baking qualities are concerned. This will enable plant breeders to drop poorer varieties after only four years, and will make available laboratory space for additional work.

——BREAD IS THE STAFF OF LIFE——

Bolting cloths for sifting flour were woven in ancient times out of horsehair, papyrus reeds and flax.

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Cereal Chemists Hear Discussion Of Lab Functions

WICHITA, KANSAS — Technical talks and a panel discussion on the functions of a mill laboratory were presented at a meeting of the Pioneer Section of the American Association of Cereal Chemists recently at the Allis Hotel in Wichita.

J. S. Schlesinger, Arkansas City (Kansas) Flour Mills, opened the meeting with various business items. Plans were made to hold a meeting Aug. 13-14 at the new Baker Hotel in Hutchinson.

A proposal was made that the group participate in a program to judge wheat samples submitted by 4-H Club members from a five-county area around Wichita. The program is sponsored by the Chicago Board of Trade and is administered by the U.S. extension service. G. W. Schiller, Hunter Milling Co., Wellington, Kansas, presented a letter from the extension service outlining the program of bringing 4-H members to view marketing facilities and judge wheat samples. The samples will be experimentally milled and baked to exhibit differences in wheat quality. The Pioneer Section endorsed the program and agreed to participate.

Dr. Robert P. Joslin, Monsanto Chemical Co., presented a new approach to cereal chemistry entitled "Rheology in Leavening Research." Using basic but unique physical concepts, he developed methods using the Resonance Elastometer. With this apparatus it was possible to measure elasticity and viscosity in flour water suspensions simultaneously. The methods of measurement were adapted from a procedure developed during the war which was used for jellied gasolines.

Russell Bell, Victor Chemical Works, Chicago, demonstrated a technique for using the polarizing microscope to identify ingredients in prepared mixes. He used polarized light to show the different refractive properties of both organic and inorganic materials usually found in mixes. The microscope has proven to be very valuable in this work and can also be used for semi-quantitative work.

At the luncheon a life membership certificate in the Pioneer Section was awarded to Lloyd Leatherock by R. B. Potts, Wichita Flour Mills. Mr. Leatherock recently retired from the Kansas Milling Co. after nearly 35 years as a cereal chemist. His life membership brings the total to three. Preceding him were A. A. Towner and R. B. Potts.

A panel discussion involving the functions of a laboratory was presented. The subject of wheat as it may be involved in the functions of a laboratory was presented by G. W. Schiller, Hunter Milling Co. Wheat surveys each crop year to determine the origin of quality wheat were outlined. One of the most important considerations of a survey is to obtain representative samples. Car lot samples proved to be best. The value of repeated blending of wheat mixes was stressed.

Mr. Eckberg, Abilene (Kansas) Flour Mills, gave a report for Mr. J. B. Morgenson, who was unable to be present. The subject was products control. It was pointed out that control ahead of milling is often more useful than control after milling.

Robert Hoecher, Consolidated Flour Mills Co., Wichita, discussed functions of a laboratory as it may aid the sales department. He stressed that the prime function is to supply bakeries with technical information to guide the baker and inspire him to correct his own troubles. Frank Wichser, Pillsbury Mills, Inc., Enid, Okla., was unable to be present. He was to have presented his views on coordination.

The subject of research in the mill laboratory was presented by James Mills, Kansas Milling Co., Wichita. He outlined the needs for research in cereal industry and pointed out that research is divided into two general classes—practical or applied—and basic or pure research. Mr. Mills believed that basic research can best be done by universities and research groups. This statement brought out some rather spirited discussion. It was pointed out by the group that the basic knowledge of the physical and chemical differences of flour as yet remain undiscovered. Were it possible to break flour down to its basic minimum structure and to determine the differences between good and poor quality on that level, it would be possible to reconstitute a new flour of any desired specifications. Many technical people agree that more basic research is necessary if the cereal industry is to survive as it is known today.

The meeting was concluded by installing the new officers for the coming year. Leslie Longshore, New Era Milling Co., Arkansas City, is the new chairman; Layton Perry, General Mills, Inc., Oklahoma City, vice chairman, and James M. Mills, Kansas Milling Co., is the new secretary-treasurer.

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INSIDE SCIENCE

The Vital Story of MACARONI* ENRICHMENT

by Science Writer

This is the fourth article in a series devoted to the story of cereal enrichment

Dramatic results have been recorded about the value of enrichment in improving health. From the United States, the Bataan peninsula in the Philippines, Newfoundland and many other parts of the world comes word of the great benefits which result from enrichment.

For years, some forward-looking manufacturers of macaroni and noodle products have used enrichment to make their good foods better. They know that enrichment restores important vitamin and mineral values which are unavoidably lost in milling, and they recognize their responsibility to provide the greatest health-building benefits for the public.

Enrichment is really a simple process. It adds the following essential elements to the food during manufacture.

Thiamine—also called vitamin B_1. This vitamin helps to build physical and mental health. It is essential for normal appetite, intestinal activity and sound nerves.

Riboflavin—also called vitamin B_2. This vitamin helps to keep body tissues healthy and to maintain proper function of the eyes. It is essential for growth.

Niacin—another "B" vitamin, is needed for healthy body tissues. Its use in the American diet has done much to make a serious disease called pellagra disappear.

Iron—is a mineral used in all enrichment. It is essential for making good, red blood and preventing nutritional anemia.

Products made from semolina may be enriched by two methods. One uses small square wafers which contain all the vitamins and iron necessary to enrich 100 lbs. The wafers break up in a small amount of water which is then added to the paste. For manufacturers who use the continuous press method, a powdered concentrate of the vitamins and iron, called a premix, is available. This is added by a mechanical feeding device.

*Macaroni is used here in the generic sense. It includes all alimentary pastes: macaroni, spaghetti, pastina, noodles.

These are the minimum and maximum levels, in milligrams per pound, required by the Federal Definitions and Standards of Identity for enriched alimentary pastes.

	Min.	*Max.*
Thiamine (vitamin B_1)	4.0	5.0
Riboflavin (vitamin B_2)	1.7	2.2
Niacin	27.0	34.0
Iron	13.0	16.5

NOTE: These levels allow for 30% to 50% losses in kitchen procedures.

Nowadays scientists are able to "build" duplicates of many of Nature's essential complexes in the laboratory. This has happened with many vitamins. First the chemical composition is learned and the pure substance is isolated. Then a "duplicate" is made which is identical chemically and biologically with Nature's product. A vitamin is a vitamin regardless of its source just as salt is salt whether it comes from a mine or is evaporated from the sea. So efficient is large scale manufacturing that vitamins are sold at a lower cost than if they were extracted from natural sources.

The Hoffmann-La Roche people, who produce a good percent of the vitamins used in enrichment, use amazingly complex processes with scientific production controls. This requires modern, special equipment filling whole buildings, each one a city block square and many stories high.

The combination of scientific research, thorough know-how and mammoth manufacturing processes—plus the far-sightedness of leaders in the macaroni industry—is helping vitally to make good macaroni products better.

This article, reprints of which are available without charge, is published as a service to the macaroni industry by the Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 286 St. Paul Street, West, Montreal, Quebec.

Worth Looking Into

New Products
New Services
New Literature

This reader service department announces the development of new and improved products, new services and new literature offered by manufacturers and suppliers. Claims made in this department are those of the firm concerned. Use the accompanying coupon to obtain the desired information.

No. 4020—X-Ray Publication

The x-ray department of General Electric Co. has begun publishing a new quarterly publication called Radiation Digest. The publication carries original material in digest form plus abstracts of current literature. Radiation Digest is distributed to representatives in the milling, food and several other industries in which x-ray, electron beam and related radiation devices are employed. The first issued contained, among other things, an article on applications for cathode rays in the food, grain and other fields. Further information may be obtained by checking No. 4020 on the coupon and dropping it in the mail.

No. 4019—Wheat Booklet

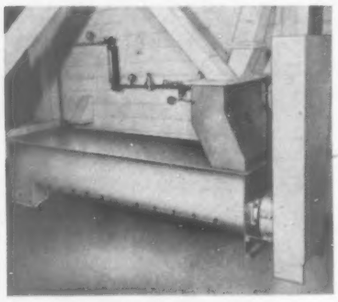
An indication of the trend of wheat varieties in Kansas as to physical, milling and baking characteristics can be obtained from a new booklet, "Milling and Baking Characteristics of Kansas Wheat Varieties," released recently. Copies may be obtained by writing to the Kansas Agricultural Experiment Station bulletin department, Kansas State College, Manhattan. The circular number is 303.

No. 2869—V-Belt Bulletin

A six-page interim bulletin which provides in condensed form the necessary information on the new method of calculating the horsepower capacity of a "Texrope" V-belt drive has been released by Allis-Chalmers Manufacturing Co. The belt ratings resulting from this new method take into consideration the effect of belt length, ratio of the diameters of both the driving and driven sheaves upon the horsepower rating of the belt, and resultant belt life. These are features which were not adequately reflected in the former V-belt horsepower ratings, the company said. The new formula provides means of determining the ratings for both standard construction and high capacity "Texrope" V-belts. All sheave and V-belt manufacturers in the industry have approved and accepted the belt horsepower ratings derived from this new formula, Allis-Chalmers said. Copies of the advance bulletin, "Guide for Figuring 'Texrope' Drives" may be obtained by checking No. 2869 on the coupon and dropping it in the mail.

No. 2889—Feed Conditioner

The development of a new feed conditioner, designated the Tandem Mix, has been announced by the



Strong-Scott Mfg. Co. Featuring positive moisture control (see photograph), the machine is designed to blend additives into mill or mixed feeds. It is available in three models, featuring an overall capacity range of 5 to 20 tons an hour. Model No. 8 has a capacity of five to 10 tons an hour; model No. 10, 10 to 15 tons an hour; and model No. 12, 15 to 20 tons an hour. Exact capacity will vary, however, depending on the weight per cubic foot of the material to be treated. The Tandem Mix operates on the tandem agitator principle —twin shafts with variable angle paddles revolve from the inside toward the outside at a speed of 400 r.p.m. This vigorous action is said to thoroughly mix any additives to the base material. For more information check No. 2889 on the coupon and mail it.

No. 2859—Transmission

Gas-powered Carloader-model fork trucks in 3,000-5,000 lb. capacities are now available with Hydratork drive—a transmission which does away with the need for a gear shift, high and low gears and a clutch and clutch pedal, it was announced by Clark Equipment Co. First available on the 6,000-7,000 lb. capacity line, the transmission is now in production for factory installation on the lighter-capacity line of the firm's trucks. The drive combines a torque converter with a simple constant-mesh transmission, and makes it possible to operate a gas-powered fork-truck with three controls, an accelerator, a brake pedal and a forward-reverse selector lever located on the steering column. For more complete information check No. 2859 on the coupon and drop it in the mail.

No. 3525—Door Control

Barber-Colman Co. announces its new Barcol commercial electric door operator with radio control, known as model L electric operator with model E radio control. The model L is capable of handling doors up to 12 ft. high and 150 sq. ft. in area, the company states. The truck operator can open the door without leaving his truck by pressing a button on the instrument panel, it is explained. The operating unit is installed above the perpendicular to the center of the door opening. The electronic receiver is mounted on the operator and each truck which is to operate the door is equipped with an electronic transmitter. The door can be stopped at any position, it is claimed. Receive more information by checking No. 3525 on the coupon and mailing it.

No. 6032—Automatic Scale

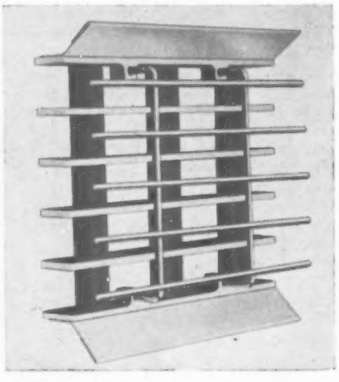
Thayer Scale & Engineering Corp. has introduced two new automatic filling scales. One, designated as Model 1000G, is a gross-weight filling scale which automatically holds, fills, check-weighs and releases bags weighing from 25 to 200 lb. while holding its accuracy tolerances within 2 oz. Model 1000N is a new weight filling scale which automatically preweighs, check-weighs and discharges loads of material weighing from 25 to 200 lb. Illustrated descriptive material is available. Check No. 6032 on the coupon and mail to this newspaper.

No. 6033—Dock Ramps

A new brochure, detailing its complete line of hydraulic adjustable loading ramps, has just been released by Rowe Methods, Inc. The ramps are available in two basic types. The "Adjust-A-Dock" is designed to become a part of or an extension of existing loading docks; the "Adjust-A-Truck" units are built into the pavement in front of the loading dock. Either the dock or the truck itself can thus be easily adjusted to the same level, the makers point out. Literature, well illustrated, presenting design and construction features of the equipment is available. Check No. 6033 on the coupon and mail to this newspaper.

No. 6029—Magnetic Grate

Designed to be placed in hopper throats on floor openings, magnetic grates manufactured by the Homer Manufacturing Co., Inc., are said to trap even the smallest tramp iron particles, thereby preventing their entrance into machinery. The grate consists of a wire grid with horizon-



tal rods placed between highly saturated magnetized bars. The horizontal rods reflect free flowing material into streams which wipe the magnetized bars. The grate is also said to prevent large debris of all kinds, papers, rags, sticks, stones, etc., from passing through. The grates, built in sizes from 2 in. x 4 in. up to 6 or 8 ft. square, can be hung in any opening through which free flowing materials pass, and can be readily lifted out to remove accumulated tramp iron and other debris. For further information, check No. 6029 on the coupon and mail to this magazine.

Send me information on the items marked:

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- ☐ No. 2869—V-Belt Bulletin
- ☐ No. 2889—Feed Conditioner
- ☐ No. 3525—Door Control
- ☐ No. 4019—Wheat Booklet
- ☐ No. 4020—X-Ray Publication
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Study of Consumer Bread Preferences Ready for Testing

WASHINGTON—Members of the Baking Industry Research Advisory Council met with U.S. Department of Agriculture officials recently to hear a progress report on an investigation of consumer preferences for white pan bread and to consider the future of this activity.

The study, originated more than a year ago by the then baking specialist of the USDA, Philip Talbott, and directed now by Forrest Clements of the Market Surveys Section, Agricultural Marketing Service, with the guidance of the council, has advanced to the point where it is just about ready to be tested on a large scale in a mid-western city.

It is believed that this is the first time such an intensive effort has been made to determine the types of white pan bread preferred by consumers. Before the study is completed the federal government will have spent significantly of Research and Marketing Act funds, and the baking industry, through the American Institute of Baking and the individual bakeries which cooperate in the project, will carry their fair share of the cost of this important study.

Much of the preparatory work has been performed at the American Institute of Baking in Chicago. There, under the direction of the scientific director, Dr. William B. Bradley, student panels selected from a total of 24 different bread formulations seven breads which to them were "discriminable," or, in other words, were noticeably different. In order to obtain the several formulas amounts of three ingredients, nonfat milk solids, lard and sucrose were varied, and the specific volume was also changed.

The latest phase of the activity has been large scale consumer testing in suburban Washington, D.C., which verified the AIB findings on four of the "discriminable" breads. The breads for this part of the study were baked in the Charles Schneider Baking Co., of which the president is Lewis G. Graeves, board chairman of the American Bakers Association and also a member of the research council.

The next step will be more verification—the large scale study planned for a medium sized mid-western city.

After that, once the scientists connected with the study are sure of their ground, the four test breads will be surveyed in numerous cities throughout the country.

The council, which has been counselling the USDA for some four or five years, beginning with the bread staling study being conducted also at the AIB, has come to be recognized by government as the industry's unofficial, informal scientific consultive group. Members are not compensated; the firms for which they work foot their expenses when attending meetings, which are called two or three times a year, usually in Washington.

Chairman of the group since it was organized, and just named to another term, is George Garnatz of the Kroger Food Foundation, Cincinnati. Other members of the council are: C. J. Patterson, C. J. Patterson Co., Kansas City, Mo.; Charles Glabau, Bakers Weekly, New York City; Oscar Skovholt, Quality Bakers of America Cooperative, Inc., New York City; Gaston Dalby, Ward Baking Co., New York City; Walter N. Clissold, Baking Industry, Washington, D.C.; Dr. G. C. Robinson, Continental Baking Co., New York City; Dr. William Cathcart, A & P Tea Co., New York City; Ralph Mitchell, Purity Bakeries Corp., Chicago, Ill.; Roland Selman, R. W. Selman & Associates, Kansas City, Mo.; Arthur S. Tatcher, Sunshine Biscuit Co., Long Island City, N.Y.; Dr. William Bradley, American Institute of Baking, Chicago, Ill.; Dr. Chester W. Ofelt, Northern Regional Research Laboratory, U.S. Department of Agriculture, Peoria, Ill.; Dr. R. T. Bohn, Bohn Food Research, Inc., Scarsdale, N.Y.; William A. Quinlan, counsel, Associated Retail Bakers of America, Washington, D.C.; Joseph M. Creed, counsel, American Bakers Assn., Washington, D.C.; and Mr. Graeves.

PAPER SACKS FOR MILLERS
The Chatfield & Woods Sack Co.
CINCINNATI, O.

—BREAD IS THE STAFF OF LIFE—

EXPANSION PLANNED

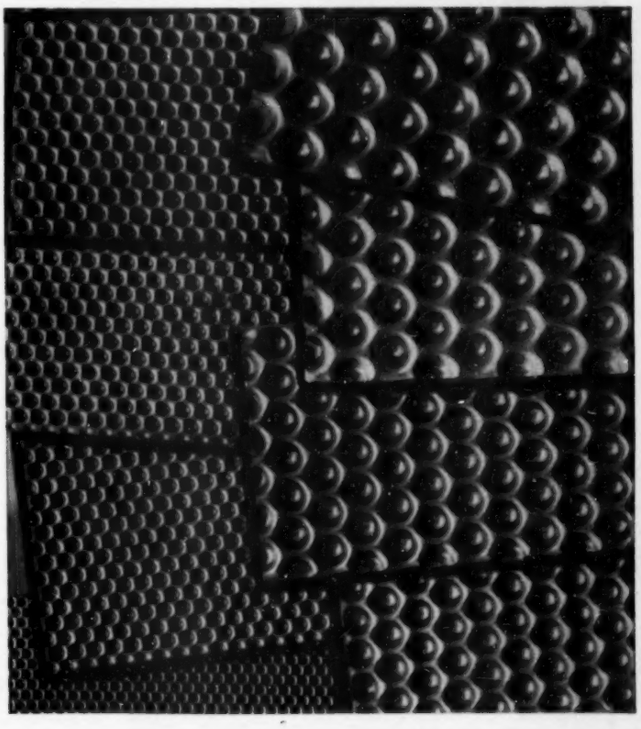
HUTCHINSON, KANSAS — The Reno Consumers Cooperative Assn. has completed plans for a 250,000 bu. elevator at the west edge of Hutchinson. Once it is completed the association's 26,000 bu. structure located on the same site will be used entirely for feed purposes. The new elevator will be ready for the 1954 harvest, according to Clinton Mayhew, manager.

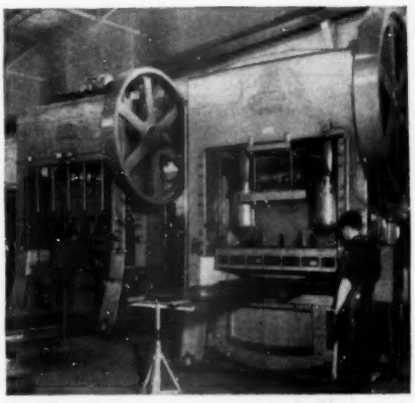
—BREAD IS THE STAFF OF LIFE—

500,000 BU. EXPANSION

GOODLAND, KANSAS—The Iron Mueller Grain Corp, has launched a construction program which will enlarge the firm by 500,000 bu. of storage space to 750,000 bu. capacity.

The story behind an *INDENT*





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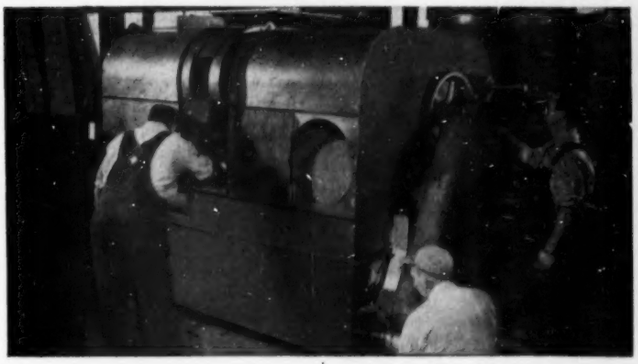
INDENTS OF MANY SIZES play an important role in the success of the Superior Grain Separator Company. You see, they are the kernel "pockets" in the indent cylinders our machines use for length grading. The care and "know-how" with which even these small indents are made has helped keep Superior machines best in the industry for accuracy, precision and profitable operation.



SKILLED CREWS complete the assembly of the flexible, high-capacity machines in Superior's full line of grain cleaning, grading, treating, scalping and aspirating machinery. Then they are packed and shipped to grain storing, shipping, milling and seed processing industries all over the world.

SUPERIOR MACHINES are designed by practicing seedsmen, then custom-built to meet local conditions and requirements. Every machine is backed by a money-back guarantee based on *complete* customer satisfaction. Our company has been built on customer satisfaction, and we continue to grow because we insist that every process and part, no matter how small, meets the highest possible standards of quality.

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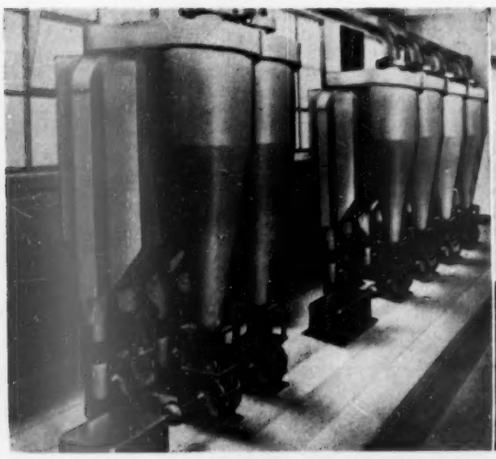
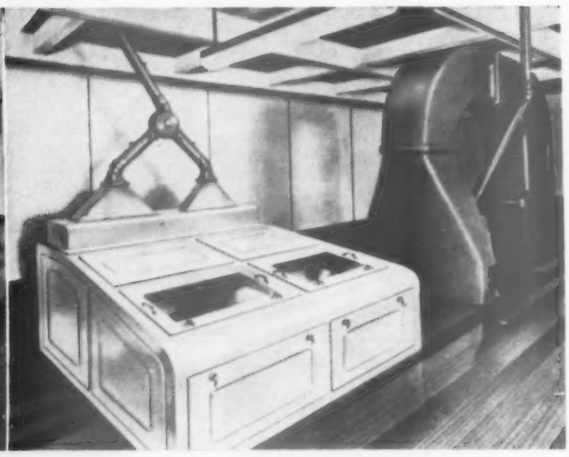
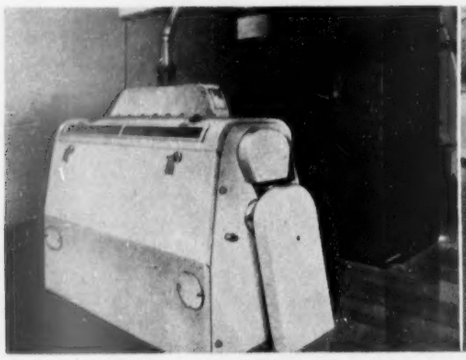
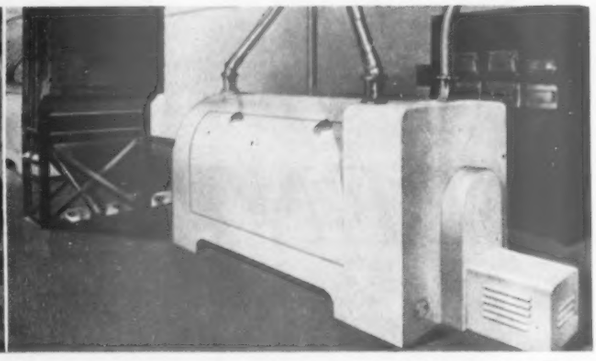




The picture on the left shows the Robinson receiver-aspirator, which is described as the "heart of the new all-metal screenroom." The picture on the right shows the "Pneu-Separator."





The "Pneu-Flow Lord Brush, type PBm, illustrated in the picture on the left, is smaller and more compact than its predecessors, Robinson engineers note. They say no aspirating chambers are needed in the "Pneu-Scourer," shown in the picture on the right and that it is smaller but as efficient as previous models.

New Screenroom Installation

A screenroom using both a "Pneu-Flow" conveying system and new all-metal machinery is to be started up soon. This development, by Thomas Robinson & Son, Ltd., Rochdale, England, is claimed as a "revolutionary combination" in Robinson screenroom technique.

When Robinson engineers undertook the planning and production of this screenroom, the first step was to take the "Pneu-Flow" system and to apply it to the screenroom for the conveying of uncleaned stock.

Robinson officials said that one effect of the introduction of Pneu-Flow to the screenroom is to reduce building space requirements by eliminating bucket elevators and worms. "It is choke-free, increases efficiency and reduces maintenance and labor," they continued. It is not necessary to equip each screenroom machine with aspirating sections. Aspirations are centralized within dual-purpose receiver-aspirators which are placed at the head of each pneumatic lift, groups of these units being connected to a single pneumatic fan which discharges to atmosphere. A double-cyclone receiver can be employed at the head of the lifts when separations by aspiration are not required."

New Machines

Old machinery has been replaced by re-designed all-metal machines which are "streamlined" and reduced in size while maintaining specified capacities, Robinson says. The new machines are the "Pneu-Flow" Receiver-Aspirator, "Pneu-Separator," "Pneu-

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Scourer" and "Pneu-Flow" Lord Brush.

Wheat is drawn from the dirty wheat bins through measurers and elevated to the first receiver-aspirator on the top floor. The grain is separated from the air with a proportion of its impurities. These impurities are drawn into the aspirating chamber upon entering the machine while the grain is discharged into a cylindrical reception chamber.

It then flows down in a thin stream across the aspirating leg meeting the stream of air rising from the base of the chamber. Free dust and beeswing are removed in the upward current of air, separated from it in the cyclone and discharged through the wheel vale at the base. The grain is collected in a catch box and discharged through a wheel valve.

A cast-metal block in the receiver-aspirator is used to reduce the velocity of the grain at the top of the aspirating chamber.

Robinson noted that the grain receives a double separation. Some of the impurities are removed when the air is separated from the grain at the base of the aspirating chamber. Further impurities are removed when the falling grain encounters the up-rushing air in the aspirating leg.

Robinson officials said that a minimum volume of conveying air is required and that pressure requirements for the receiver-aspirator are at a minimum.

Control

In control of the receiver-aspirator, one valve, above the cyclone, is set when the machine is installed and requires no further adjustment, according to Robinson engineers. The valve, which controls the separation by varying the velocity of air in the leg, is regulated from the back of the machine, while it is possible to observe the separations in the chamber through glass panels. Sight inspection tubes are fitted so that the discharges can also be observed.

The wheat discharged from the receiver-aspirator enters the "Pneu-Separator" through a spreader box to assure even distribution over the top sieve. Large rubble and straw are collected on this upper sieve; a second rejects peas, maize and large grains; while a third dresses out sand and small seeds. The second and third sieves are kept free from clogging by ball cleaners.

Robinson engineers say in regard to the separator that, by dispensing with the need for individual aspirations and by using smaller steel members, it has been possible to reduce the height of the machine by 2 ft. 6 in. Among features of the type PZm machine, the engineers say, are "easily removed doors which give ready access to the feed-spreading device, the hangars and eccentrics — also the head and tail ends of the three sieves. To help eliminate vibration, the eccentric shaft is placed low down in the base of the machine with the eccentrics close together."

Scourer

From the "Pneu-Separator" wheat is spouted, by way of the cylinders, to the "Pneu-Scourer." Robinson officials say the over-all dimensions of this machine have also been reduced and the operating surfaces increased. Air is drawn into the drum with the wheat through "ultra-indented cylinders." The drum is lined with emery covers, against which wheat is driven by adjustable steel beaters on the axial shaft. The drum does not have perforated metal sections, and the entire surface is used for scouring, the engineers note.

The wheat is then reelevated to the next receiver-aspirator on the top floor, by this method: The grain leaves the drum, falling into a lifting chamber connected to the pneumatic lift. A revolving rotor on the main shaft flings the wheat into the conveying air stream from where it is carried to the receiver-aspirator. The lifting chamber is fitted with an alternative spout so that the scourer can be by-passed without a separate lift.

As the entire input of wheat to the machine is lifted out of the machine after treatment, Robinson engineers say, no provision need be made for drawing off stocks from below. It is therefore practicable to install scourers in the basement of the screenroom, lifting the scoured wheat from the top of the machine, thus reducing the vertical lift. The height of the scourer has been reduced so that it can be installed right beneath the bins.

The grain then travels through a stoner, washer and whizzer, and then into a drier and conditioner.

A receiver-aspirator conveys it into the conditioning bins, from where it is passed through measurers to a second "Pneu-Scourer." Alternatively, a "Pneu-Brush" can be installed. This machine is essentially the same as the scourer, the difference being that the emery drum is replaced by an outer drum of hard-wearing bristle. The beaters are replaced by revolving brush segments and propellors, the brushes being adjustable accord-

(Continued on page 22a)

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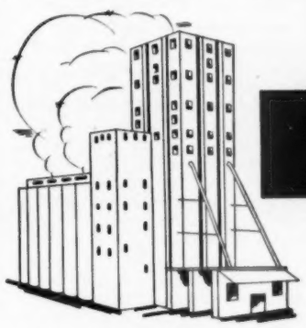

Third in a series of three

A SURVEY OF GRAIN FUMIGANTS

THE BASIC TYPES

Commercial grain fumigant formulation during the past 25 years has relied on a small group of industrial solvents plus a few other compounds of different classification. Nearly all such compounds were originally developed for other uses. They have merely been adapted to grain fumigation, a process in which industrial availability and relative cost have been important factors. These compounds are:

COMPOUND	NATURAL STATE (68° F.)	BOILING POINT
Carbon tetrachloride	Liquid	170° F.
Carbon bisulphide	"	115° "
Ethylene dichloride	"	182° "
Propylene dichloride	"	206° "
Chloropicrin	"	234° "
Trichloroethylene	"	189° "
Ethylene dibromide	"	269° "
Acrylonitrile	"	172° "
Benzol (benzene)	"	176° "
Methyl bromide	Gas	40° "
Sulphur dioxide	"	14° "
Calcium cyanide	Solid	.....

Commercial grain fumigants consist of the above compounds; either singly, or varying percentages of two or more. Since most fumigants are mixtures, it is commonly assumed they will reflect, proportionately, the laboratory toxicities of their components. This is not always the case. It depends on the volatility of the compound and on the density and diffusion and sorption rates of its vapors in bulk grain. Thus grain elevators are the only adequate testing grounds for grain fumigants.

While it is therefore an oversimplification to try to reduce grain fumigant performance to a strict formula basis, some classification and evaluation of the relatively few basic fumigant types may be useful.

It is often said that fumigants must do a better job today because of stricter insect grading and new emphasis on hidden infestation. This has increasingly focused attention on use of adequate dosage so as to secure satisfactory kills not only of visible stages, but also of invisible stages—always the crux of fumigant performance.

The following evaluation is therefore a practical conception, based on experience and observation, of the dosages needed to secure satisfactory immediate and long-term results in fumigating average-condition grain in concrete elevator tanks. Costs are necessarily approximate. They are based on average range of delivered L.C.L. and L.T.L. prices.

THE BASIC GRAIN FUMIGANTS

(Percentages by volume unless otherwise indicated)

1. **"80-20" mixture: 80% carbon tetrachloride-20% carbon bisulphide-with or without a small percentage of sulphur dioxide.** Most important grain fumigant type, probably accounting for ⅔ of all usage to date. Excellent penetration, diffusion and sorption and highly adaptable to various treating conditions. However, unless specially processed, vapors are flammable and explosive, thus leading to occasional insurance restrictions. In recent years 3½ to 5% **ethylene dibromide** occasionally added to basic mixture on theory that it improves kills of immature stages. But since the "80-20" mixture already excels in this respect, it is very doubtful that ethylene dibromide, with its high boiling point and limited diffusion, can improve this type of mixture. Dosage for concrete tanks: 1¾ gallons per thousand bushels. Unit cost: around ⅛c per bushel.
2. **80% carbon tetrachloride-15% carbon bisulphide-5% ethylene dibromide mixture.** Ethylene dibromide content will not compensate for the lowered carbon bisulphide percentage, thus calling for some dosage increase. With this exception, fumigant characteristics similar to "80-20" mixture. Dosage for concrete tanks: 2 gallons per thousand bushels. Unit cost: about 4/10c per bushel.
3. **"3-to-1" mixture: 75% ethylene dichloride (or propylene dichloride)-25% carbon tetrachloride.** Second in total volume of usage during past 25 years, but deficient in killing immature stages. 3 gallons per thousand bushels in concrete tanks will insure good kills of adult insects, but reinfestation picture is uncertain. On this basis, unit cost would exceed ½c per bushel.
4. **"3-to-1" ethylene dichloride-carbon tetrachloride mixture plus 5% ethylene dibromide or 3½% ethylene dibromide plus sulphur dioxide.** Latter compounds help to compensate for fumigant deficiencies of basic mixture. Dosage for concrete tanks: 2¼ gallons per thousand bushels. On wide price range unit cost would be about ½c per bushel and upward.
5. **5% ethylene dibromide-60% (or 65%) carbon tetrachloride-35% (or 30%) ethylene dichloride mixture.** Slower in action than preceding type, but, with longer exposure, possibly better on long-term results. Dosage for concrete tanks: 2¼ gallons per thousand bushels. On that basis, unit cost would be about ½c per bushel.
6. **Chloropicrin:** Highly effective fumigant, but lachrymatory effects on eyes and lack of adaptability to all treating situations handicap more widespread use. Adequate dosage for concrete tanks: 3 pounds per thousand bushels. Unit cost: ¼c per bushel and over.
7. **Variable mixtures of carbon tetrachloride (about 75%) and 10 to 20% benzol to which is added 2 to 3% sulphur dioxide (by weight).** A variation of the basic formula contains about 3½% **ethylene dibromide.** A minor percentage of **trichloroethylene** is another variation. A dosage of 2½ gallons per thousand bushels in concrete tanks, with long exposure, is indicated. On that basis, unit cost would be above ½c per bushel.
8. **Calcium cyanide:** reacts with moisture to form **hydrocyanic acid gas,** a highly toxic but effective fumigant. Adequate dosage in concrete tanks: 15 pounds per thousand bushels. On that basis, unit cost would be around 4/10c per bushel.
9. **90% carbon tetrachloride-10% acrylonitrile mixture:** A comparative newcomer. Manufacturer recommends an average 1¾ gallons per thousand bushels in concrete tanks. Resulting cost would be about 4/10c per bushel.
10. **Methyl bromide:** Current recommendations confined to carload treating and flat storage fumigation with special equipment.

Weevil-Cide
The DEPENDABLE GRAIN FUMIGANT
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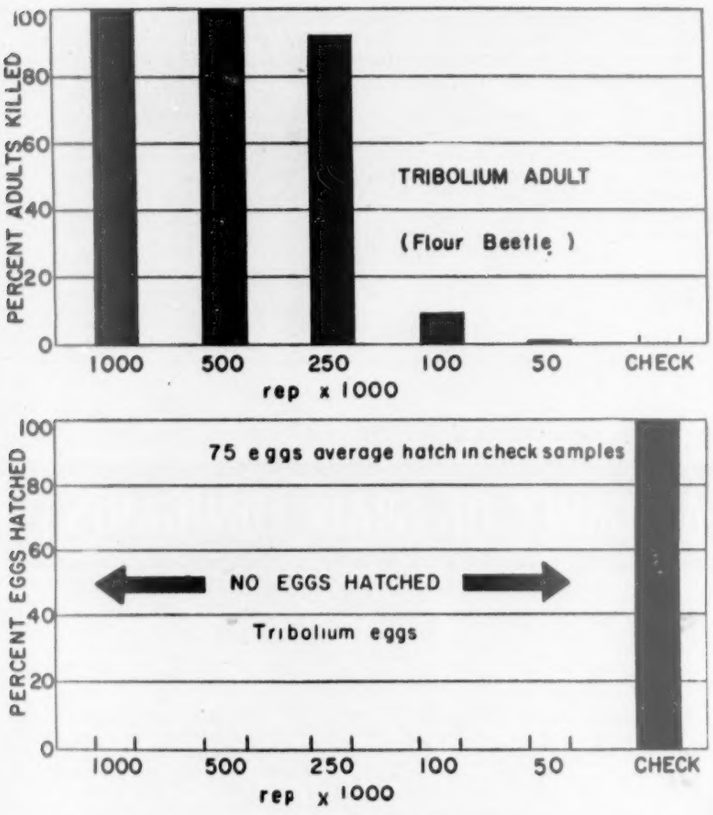


FIG. 2—(Above) Per cent flour beetle adults killed one week after having been irradiated with various doses of 2-million-volt electrons. (Below) Per cent flour beetle eggs hatched after an incubation period of 43 days from day of irradiation with various doses of 2-million-volt electrons.

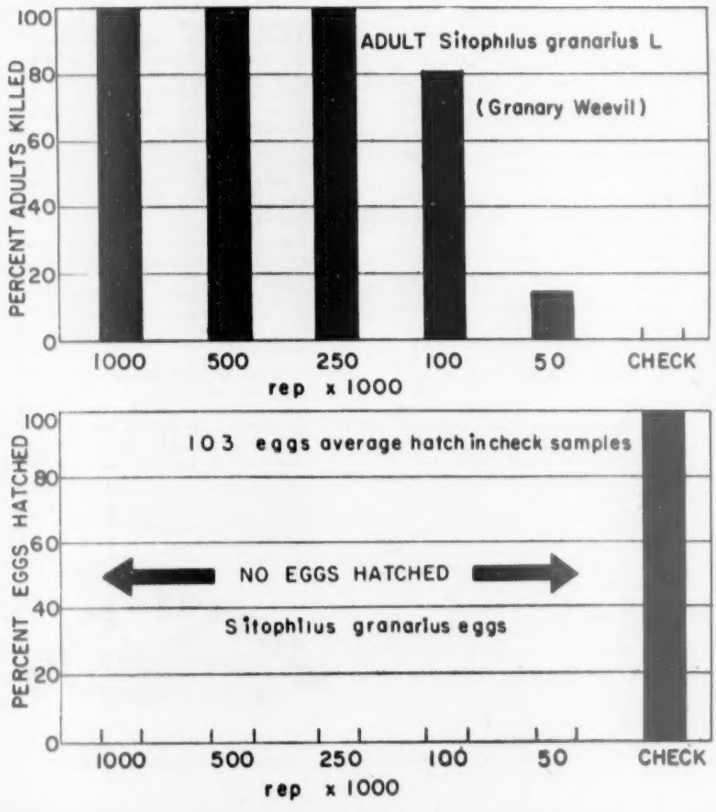


FIG. 3—(Above) Percent granary weevil adults killed one week after irradiated with various doses of 2-million-volt electrons. (Below) Per cent granary weevil eggs hatched after an incubation period of 43 days from day of irradiation with various doses of 2-million-volt electrons.

Electrons

(Continued from page 1a)

from irradiated wheat flour, even at dosages great enough to kill the adult insects immediately after treatment, or a dose 50 times more than needed for egg sterilization. Preliminary baking tests were conducted, using about 38 lb. of whole wheat flour irradiated with 500,000 rep and about 38 lb. of whole wheat flour made from irradiated Cornell 595 wheat receiving a treatment of 500,000 rep.

Treated flour was made into a 100% whole wheat loaf which was baked. The flour from the treated wheat was almost the consistency of a meal and required some white flour for satisfactory fermentation. This was the result of the grinding. Both products produced a satisfactory loaf of bread. Some differences were noted in tenderness, flavor and moistness as compared with flour from the same wheat untreated. Some tasters actually preferred bread made from treated flour. Bread baked from treated and untreated flour is shown in Fig. 5. Further baking and taste tests are planned with reduced dosages, before definite conclusions can be reached.

The effect of accelerated electrons on vitamins has been studied by Dr. B. E. Proctor and his associates at the Massachusetts Institute of Technology. Their data indicated that there was no appreciable destruction of niacin and carotene in a concentration of 100 micrograms per Ml when treated with a dose of 10,000 rep. There was about 95% retention of riboflavin with the same dilution as above, when treated with a dose of 100,000 rep. Other important observations on vitamins were also made by Dr. Proctor and his associates.

The doses of electrons used definitely damage wheat for use as seed. Seed receiving a dosage as high as 500,000 rep will sometimes germinate, but will not emerge and grow when planted. Wheat plants from seed receiving dosage of 10,000 rep, which is enough to sterilize insect eggs, are definitely retarded in growth.

The calculated cost of electrical energy for treating wheat and flour, assuming 2¢ per kwh, and a dose of 100,000 rep with an overall efficiency of 10%, is about 15¢ per ton. With a dose of 10,000 rep, the cost of energy is about 1.5¢ per ton. The major cost to be considered is the installation or first cost. The present equipment now in use was designed primarily for experimental purposes and involves a rather high investment. Future equipment costs may be reduced if a number of machines can be built to treat food products.

Summary

The biological and chemical effects of accelerated electrons are the same as X-rays and gamma rays. No in-

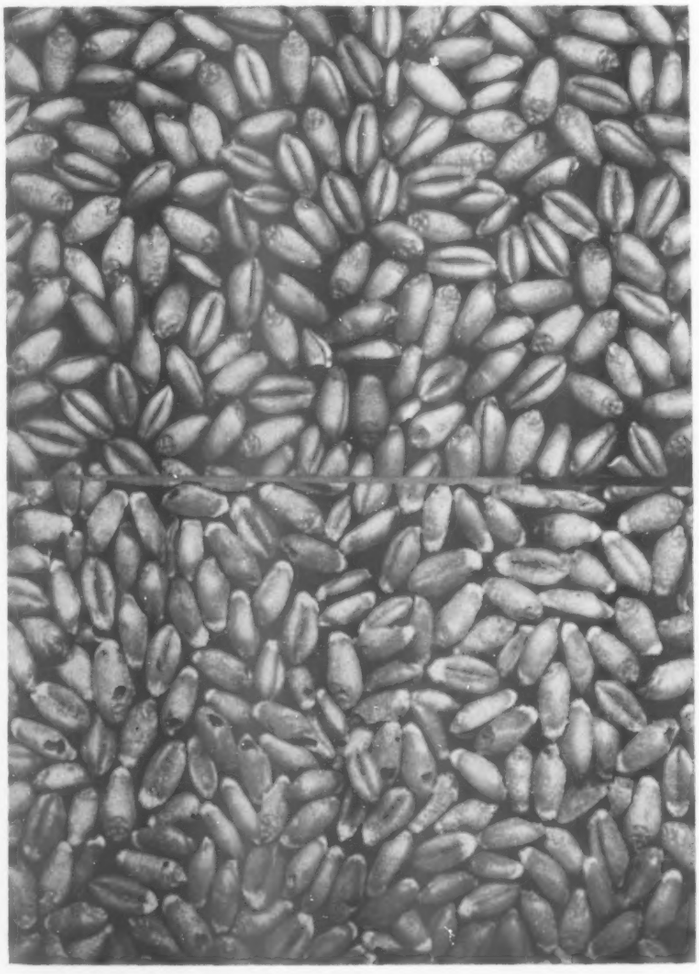


FIG. 4—(Above) Wheat artificially infested with granary weevils, treated with accelerated electrons (100,000 rep) from the Van de Graaff accelerator. This picture was taken after an incubation period of about 43 days from date of treatment. (Below) The picture below shows wheat artificially infested with granary weevils, used as a check sample (untreated). The picture was taken after an incubation period of about 43 days from date of treatment.

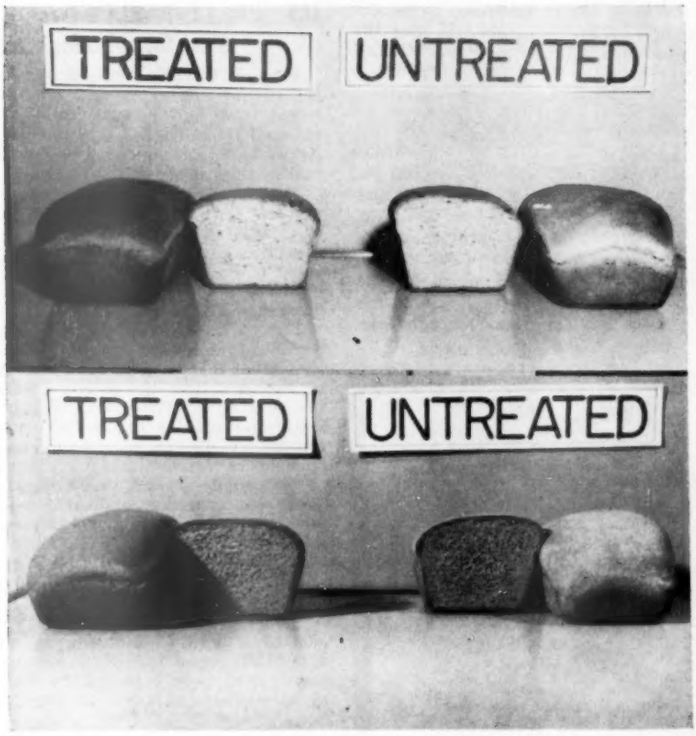


FIG. 5—Top picture. (Left) Bread made from 75% whole wheat flour, which was made from wheat receiving a dose of 500,000 rep, and 25% white flour made from untreated wheat. (Right) Bread from 75% whole wheat flour made from untreated wheat and 25% white flour made from untreated wheat. Bottom picture. (Left) Bread made from 100% whole wheat flour which was made from treated wheat (500,000 rep). (Right) Bread made from 100% whole wheat flour made from untreated wheat.

duced radioactivity is produced in the product at voltages below 21 million volts. The penetration of accelerated electrons into matter is less than that of X-rays of corresponding voltage; however, their penetration is enough to be considered.

Results from research work have shown that accelerated electrons can be used to control insects in small samples of wheat and flour. An electron dose as low as 10,000 rep will sterilize flour beetle and granary weevil eggs and this same dose prevented the adults from reproducing.

A dose of 500,000 rep was lethal to 100% of adult flour beetles immediately after treatment, whereas a dose of 2.5 x 10^5 rep was lethal to 100% of adult granary weevils immediately after treatment. A dose of 250,000 was lethal to 92% of adult flour beetles one week after treatment, and a dose of 1 x 10^5 rep was lethal to 82% of adult granary weevils one week after treatment.

Doses exceeding 10,000 rep were detrimental to wheat seed. Seed treated with a dose above 100,000 rep germinated but did not emerge and grow.

Treatment with electrons has the advantage that the electron dose can be metered, thereby providing a continuous record of an uninterrupted flow of product on a conveyor belt beneath the electron beam.

When accelerated electrons are used to sterilize foods, certain side effects may be produced which may cause changes in color, flavor and sometimes texture. Studies are being made in an effort to minimize these changes. Irradiation of materials in inert atmospheres or in a vacuum and in the frozen state minimizes but does not prevent such changes.

What Does The Future Hold?

What does the future hold? In general the future looks bright for electronic or so-called "cold sterilization" of foods. If satisfactory processes can be worked out, this process may revolutionize the food industry.

However, further research is needed, and some is now in progress, on the effects of accelerated electrons on the baking, keeping and nutritional properties of milled products. Perhaps in the future, grain products can be treated with electrons before storage, and milled products before packaging, and thus eliminate or reduce the insect damage problem. This would save millions of dollars annually.

ACKNOWLEDGMENTS

The authors wish to thank Dr. Margaret A. Ohlson, Miss Mary L. Moor and Miss Marcille Pridgeon of the department of foods and nutrition of Michigan State College for conducting the baking tests. Special acknowledgment is also due O. R. Woods and N. A. Drake of the physics department of The Upjohn Co., and to The Upjohn Co. itself for use of its Van de Graaff generator.

(a) Agricultural Engineering for November, 1953, carried Part I of a detailed technical report on this work by V. H. Baker, O. Taboada and D. E. Wiant.

——BREAD IS THE STAFF OF LIFE——

FLORASYNTH ADDITION

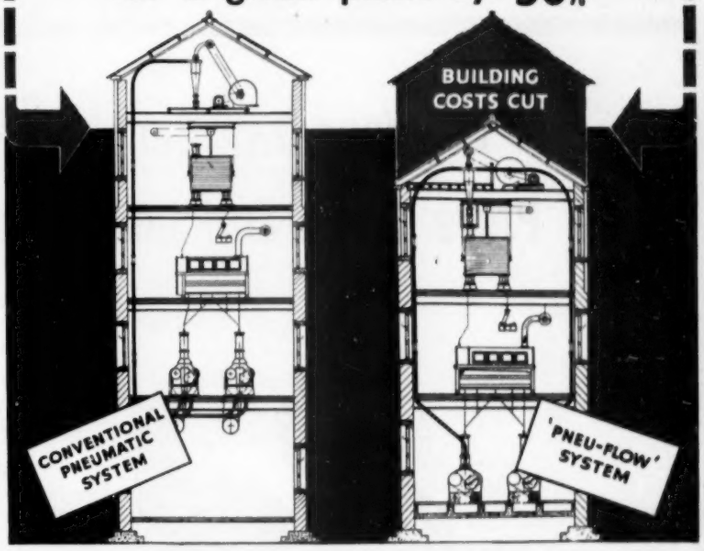
CHICAGO — Announcement has been made by William Lakritz, president of Florasynth Laboratories, Inc. of the appointment of Fred M. Belcove to the company's Chicago sales organization. Mr. Belcove received his chemical engineering degree from the Illinois Institution of Technology, and has been associated with food and chemical firms among which were Columbian Carbon Co., and Sun Chemical Co. Mr. Belcove is also a member of the American Institution of Chemical Engineers.

——BREAD IS THE STAFF OF LIFE——

NEBRASKA FIRM EXPANDS

FALLS CITY, NEB.—An expansion program has been launched here by the Englehart Elevator Co., according to Gene Beasting, partner and manager of the firm. A 150,000 bu. addition to the elevator will be completed by June 1.

'PNEU-FLOW'
PATENT PENDING
SAVES CAPITAL COSTS
It reduces building costs for a given plant by 30%



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See how 'Pneu-Flow' compares with a conventional pneumatic system—how it saves the space of a whole mill floor. You can even install rollermills in the basement.

Spouting is carried up *through* the roller-mills—reducing height of lift. Notice, too, how the cyclones are mounted immediately above the plansifter feed-boards—another saving in vertical lift and space requirements.

Entirely choke-proof, the simplest lay-out yet; free from power-wasting auxiliary mechanism, power saved compared with conventional systems. Write for information.

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STERLING DRUG INC. SETS SALES RECORD, PROFITS UP

NEW YORK—A new sales record was established by Sterling Drug Inc. for the year ended Dec. 31, 1953, and earnings both before and after taxes were higher than for the previous year, according to the annual report signed by James Hill, Jr., chairman and president.

Net sales for the year were $161,706,271, compared with $157,059,776 in 1952 when the previous peak was established. Domestic sales amounted to $100,449,602, compared with $96,809,217. Sales for use outside the U.S. were $61,256,669, or 37.9% of total sales, compared with $60,250,559, or 38.4% in 1952.

Profit before taxes was $25,610,069, compared with $24,845,968 in 1952. After provision for federal and foreign taxes on income, net profit from operations was $11,560,069, compared with $10,495,968 in 1952. After deducting preferred dividends, net earnings in 1953 were equivalent to $2.91 per share of common stock, compared with $2.63 per share in the previous year.

——BREAD IS THE STAFF OF LIFE——

320,000 BU. ANNEX

BELLEVILLE, KANSAS—A 320,000 bu. capacity concrete annex being built here by the Hall Mill & Elevator Co. is scheduled to be finished by June 1. This will give the Hall concern a storage capacity of more than a half million bushels.

——BREAD IS THE STAFF OF LIFE——

255,000 BU. EXPANSION

NORTON, KANSAS — Excavation work is under way on a 255,000 bu. reinforced concrete grain warehouse here for the N. L. Johnson Grain Co. The structure will increase the firm's storage capacity here to 350,000 bu., and will measure 89 by 56 ft. The contract calls for completion of the project by June 1. Neil Johnson owns the firm.

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U.S. WHEAT, BARLEY STANDARDS AMENDED

WASHINGTON — Amendments to the official U.S. grain standards for wheat and barley have been announced by the U.S. Department of Agriculture. The amended standards will become effective Aug. 2, 1954.

The wheat standards amendment provides that smut dockage in wheat shall be stated in terms of ½% when smut dockage is present in a quantity equal to less than 1%, and in terms of whole percent when present in a quantity equal to 1% or more.

The barley standards amendment provides that any barley that is weevily or that is injured by heat or mold be excluded from the special grades Choice Malting Two-rowed Western Barley and Malting Two-rowed Western Barley. It also provides certain changes in the limitations on seeds of wild brome grasses, varietal types other than Hannchen or Hanna, mellow kernels, thin barley, and skinned and broken kernels.

——BREAD IS THE STAFF OF LIFE——

ALLIS-CHALMERS SHOWS DIP IN NET EARNINGS

MILWAUKEE — Net earnings of $21,943,569, equal to $6.58 a common share, have been reported for 1953 by Allis-Chalmers Manufacturing Co. Sales totaled $514,474,000.

In 1952, net earnings totaled $24,457,855, and the profit per share of common stock was $7.98. Sales in 1952 totaled $513,641,331.

W. A. Roberts, president, said actual earnings on operations in 1953 were $20,772,719, or $6.22 a share. These figures were increased by closing out an unrequired tax provision of $1,170,850. Common shares outstanding increased approximately 312,000 during the year as a result of shares issued for conversion of preferred, and in the transaction through which Allis-Chalmers acquired the assets of The Buda Co.

The new Buda division contributed just under $5 million sales for the last two months of the year. This volume, plus sales of $230 million from general machinery division and $280 million from the tractor division for the full year, a little more than equaled the 1952 record.

Screenroom

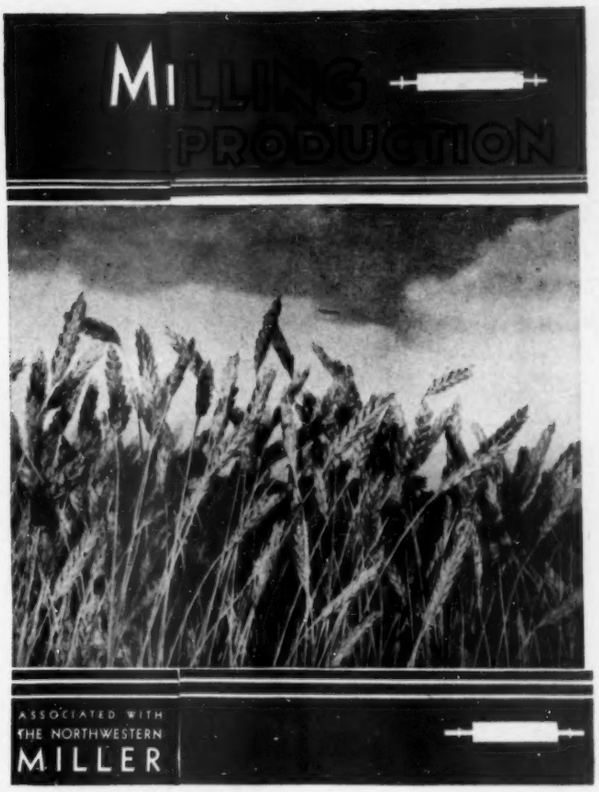
(Continued from page 19a)

ing to the degree of treatment required.

The wheat is then elevated through a receiver-aspirator feeding the mill bins which in turn feed the "Lord Brush" by way of measurers. The wheat is finally re-elevated to the last receiver-aspirator and travels to an automatic weigher and on to the mill.

Final treatment is by the "Pneu-Flow" Lord Brush. As the grain enters the machine, it passes through an adjustable feed roll and a gate which insures that it is spread evenly and thoroughly cleaned. Actual cleaning is performed by brushes—one cylindrical, revolving inside a second which is stationary.

An automatic feed gate is fitted, but it can be locked in any position if a fixed feed is preferred. The position of the three segments of the stationary brush is shown on a calibrated scale inside the door on the front of the machine, and is governed by a double control reached through panels below this door. A window in the removable panel above the main door allows the feed to be seen.



TRIPLE YOUR ADVERTISING EFFECTIVENESS

1. WORKING CIRCULATION —Studies of flour manufacture show that 436 of the flour mills in this country produce 98% of the flour. Milling Production with its controlled circulation reaches the 921 key men in these 436 flour mills. This working circulation provides contact each month with the people who directly or indirectly control the buying — superintendents, operative millers, chemists and plant managers. *There is no waste circulation—only working circulation*—and you are assured of reaching your potential customers in the most productive mills.

2. LEADERSHIP MAKES READERSHIP — Readership surveys and unsolicited correspondence from its readers attest to the editorial leadership of Milling Production. That editorial leadership is held by complete words-and-pictures reports of the latest milling technology, current news, features and complete coverage of the activities of the industry's two technical associations. *The real price the reader of a publication pays is the amount of time he puts in reading that journal.* Over one half of the readers of Milling Production have requested that it be sent to their homes so that they may enjoy uninterrupted reading pleasure.

3. DOUBLE-DUTY DOLLARS —Money spent for advertising in Milling Production does double duty. In addition to reaching the production personnel, the advertiser's message is read in the Milling Production Section of The Northwestern Miller by the executives who approve purchase orders. *No other advertising medium in the flour milling industry offers this double-duty feature of reaching both groups* — mill technologists and executives—with the same advertising message and for the cost of one advertisement. Take advantage of this 100% coverage through one double-duty advertising contract.

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